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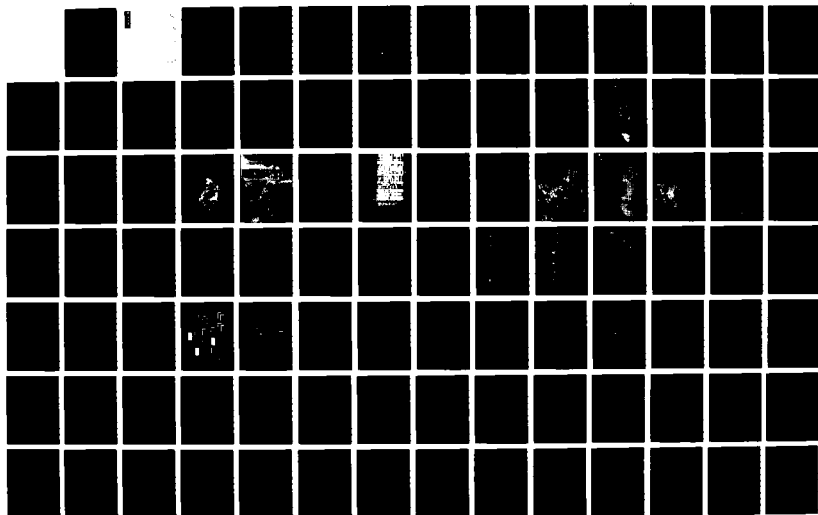
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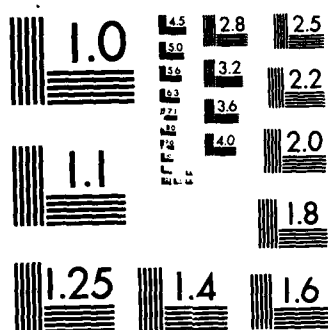
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USAWC MILITARY STUDIES PROGRAM PAPER

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REQUIREMENTS AND POSSIBILITIES BASED ON THE U.S. STATE OF THE ART

An Individual Study Project

by

Colonel Maurizio Coccia (Italian Army)

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U.S. Army War College  
Carlisle Barracks, Pennsylvania 17013  
23 March 1988

## ABSTRACT

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*Keywords: theater strategic analysis*

With these basic assumptions in mind, this author examines the complex reality of the Mediterranean theater and explores the possibilities and limitations of the warfare simulation's situation.

The final aim is to identify the key elements for a wargaming simulation structure compatible with the reality of the Mediterranean world and tailored to the Italian political-military needs.

This study presents final conclusions based upon research of the proposed structure.



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CHAPTER I

INTRODUCTION

Admiral Chester Nimitz once said that none of the major events in the Pacific campaign of World War II was surprising to him because they had all been played out in a series of war games at Newport before the war (He acknowledged an exception in the Japanese employment of Kamikaze).

Simulation and wargames are as old as war itself.

Archeologists have uncovered Egyptian miniature soldiers that might have been used by the sons of the nobility--the military leaders in ancient times--for initial training. During time wargaming has evolved considerably from these miniatures to the chessboard to the highly sophisticated computers used in today's "real time" scenarios, but the main purpose remains the same: to develop in peacetime the doctrine, tactics and battle plans that might later be needed in time of war. As such, wargaming is just a part of the overall simulation dimension. Simulation is in fact "the representation of any system or organism by another system or model designed to have a relevant behavioral similarity to the original."<sup>1</sup> What characterizes games is that they employ human beings acting as themselves or playing roles in a simulated environment.

WARGAMES BACKGROUND--SIGNIFICANCE AND TREND

Background

Wargames are related to defense matters and consequently apply to the limited but more developed area of warfare



simulation. Wargaming is used primarily to study problems of military planning, organization, tactics and strategy and can be designed to cover: the entire spectrum of conflict; politico military crises; and general or limited wars. They may be designed for joint use by two or more military Services or by a single Service. The level of command at which the wargame is to be played influences the type of units represented and the scope of operations conducted (global/strategical, theater/operational, tactical games). A wargame may be played manually or may be computer assisted. The primary advantages of computer gaming are reducing the manpower required to support the simulation and that the same situation can be simulated many times, under different conditions, so that the variability of results may also be observed. Computer wargames require the use of a model, that is a computer program, that contains all the rules, procedures, and logic required to conduct the game.

Moving from the technical and structural part of simulations to the dynamic or operational use of warfare simulation, it is necessary to point out that wargames are just a part of a triad.

#### Wargames + Analysis + Exercises

In the operational use of warfare simulation, the roles of the three processes are as follows:

--Wargame--a technique for simulating warfare environment with an objective of examining human interaction;

--Analysis or Operations Research--a scientific method of providing decisionmakers with a quantitative basis for decisions, that is, mathematics models that represent reality. These models often simplify reality by discarding non-reproducible issues, including, at times, human behavior;

--Exercises--activities involving the operation of actual military forces in a simulated hostile environment to train, experiment and provide data.

Together, wargames, analysis and exercises tend to focus in a continuous cycle of research on different aspects of warfighting reality. They provide integrated information from different sources to better obtain a balanced understanding of the potential problems and opportunities of modern warfare.

Focusing on wargames, to better understand the present research, one must remember the key elements of a wargame structure. First, any wargame must have a clearly defined and clearly stated set of objectives. These objectives help designers and analysts identify how and in what ways the game can provide the type of information needed. The second element is the scenario, that sets the stage for the game, placing players into a situation with which they must react. In many wargames the scenario is very poorly detailed although it plays a fundamental role in all players decisions and consequently must be based on solid foundations. The foundations should be the context, that is the overall environment of social, economical, political, and military problems of the selected scenario.

Because the Mediterranean theater, as will be shown in the next chapter, is in fact characterized by a very complex social, political, military, and economic situation, the research in this field will be the preeminent part of this study, in the effort of building a viable wargame as close to real life as possible.

The fourth element is the data base. This data base contains information players may use to assist them in making decisions.

Typically, this information includes forces available, their capabilities, physical and environmental conditions and other quantitative facts.

The fifth element of a wargame is a set of models. These are mathematical expressions, which translate data and decisions into game events. Models should be flexible enough to deal with unforeseen players decisions as well as with data base change.

In addition to models, a game must have a set of rules and procedures that define what players can and cannot do and reasons. Game procedures, as an example, should ensure that players receive the appropriate quantity and quality of information during play and should be able to introduce error and delay to simulate the "fog of war."

Finally, a war game must have players whose decisions affect and, in turn, are affected by the flow of events. The players background of the role they play as well as their knowledge of the game design is essential to useful game play.

#### Significance

As an exploratory tool wargaming forces participants to look at reality from a different perspective and this can lead to fundamental changes in how they see that reality. Moreover, it can lead to the discovery of factors whose importance may have been previously unsuspected or undervalued. Wargames investigate the future and by doing so are an essential tool for training and comprehension. Finally, wargames are the least expensive way to play crisis as well as combat situations without using actual forces and without any real constraints. However, the ability of a wargame to persuade and convince is a potential source of

danger because it attempts to create the illusion of reality and this can lead to self-fulfilling prophecies. It should also be remembered that the game designers as well as the analysts may also unintentionally misrepresent events and outcomes. One must proceed with the assumption that reality cannot even be totally simulated. Wargames are abstractions, not reality. They stress the items selected for inclusions and deemphasize or ignore items left out by designers. In addition, there is the tendency to leave out the human element, although real experience has forcefully and repeatedly proven that it still remains a critical feature of actual operations. Thus, wargames today continue to be constrained by a number of factors. First, the use of game results as the output of an abstraction must be augmented by judgment, common sense and more conventional research. Secondly, the degree to which computer models are reasonable, logically consistent and structurally relevant depends on the skill and judgment of their designers. Thirdly, war games like any other enterprise designed to generate or clarify ideas require experimental testing that establishes their appropriateness, effectiveness, utility and worth.

On the other hand there is another broader consideration that must be taken into account, and it is that under current trends most defensive problems are composite military operations that are entangled with social, cultural, economic and political factors within and outside of the nation. This complexity of problems and their interrelation may be solved with this highly scientific and specialized man-machine environment of warfare simulation. This requires leadership that is increasingly

well-educated and imaginative and a close link among the military and the technological-scientific-academic communities. This new environment requires better data, more operations research, greater understanding of the impact of human factors on the future battlefield, highly developed informational networks within the modeling communities and integrated management structures for study and analysis. This means a permanent defense organization with a clear specific policy that is closely tied to the defense requirements, capabilities, reality, and evolution.

### Trend

In the recent past, wargames have played a minor role in the U.S. defense. Their use has been limited to a few set-piece scenarios and they have involved a limited number of people. The full comprehension of the games potential for defense purposes traces back to 1970. It was clearly connected with a need for a systematic analysis of U.S. defense options in consideration of resources limitation and the growing difficulty of logically managing the many variables that influence organization and employment of military forces. In this perspective the last 15 years have seen an abundance of wargames for all levels of play, and all with many different scenarios. The interest for games has been expanded from the defense community to the academic, political, and economical communities. The results have been an expanded games background and an outstanding level of research and development. However, a great confusion and overlapping of contradicting approaches in all phases has occurred from the simulation definitions to the techniques for research and design

to the selection of assumptions and result appreciation. To summarize, in 1979-1980 the situation was characterized by incompatible models, lack of coordination and integration and at times a poor level of analysis and design. A new trend began when it was clearly understood that there was a need for coordination. Present day results may be summarized by the RAND Corporation's efforts to join all experiences, research, and computer science capabilities in order to fulfill the nation's decisionmakers' needs. The result is the ongoing study and development of a global, coordinated model that utilizes the great synthesis of global analysis. This model will be examined in Chapter III and is introduced in this portion of the study as a synthesis of the trend. The RAND Strategy Assessment System (RSAS) is an analytic global wargame that includes an integrated collection of models and other information systems.

The main innovations are:

- The worldwide spectrum,
- The capability to be used at strategical and operational level utilizing the same data, and the different level of decisions required in a global, coordinated wargame,
- The capability to mix human intervention and automated wargaming as desired.

The RSAS gives a clear warfare simulation trend picture:

- Concentration of warfare simulation support in a unique dynamic overall system.
- Substitution of human decisions with use of artificial intelligence.
- Potential shift of strategical analysis and issues from the political-military leadership to the scientific one.

## STRATEGY BETWEEN ART AND SCIENCE--THE ITALIAN APPROACH

The trend expresses the tendency of the scientific community to influence strategy. Strategy has always been considered at best as a sound mix of art and science.

Art and science or subjective and objective or intuitive and analytical and so on, the simulation process has always included both these components. The artistic one may be synthesized in the human dimension and its subjective decisions. The scientific one is too often identified in the computer but it is, rather, the rationalization in advance of the information of interest. In today's situation the introduction of the artificial intelligence may provide a means to include the artistic, subjective human component in computer simulations. The aim is to cope with the more and more complex scenarios in real time through computer models. Hence, in the analytical approach, the human dimension, because it is subjective and not mathematically quantifiable may also challenge the scientific, objective results.

In this cultural debate between man and machine, Italy, protagonist of this study, not only belongs to the artistic dimension but prevails with it and with good reason. Italy, the homeland of Leonardo Da Vinci still remains artistically oriented even though highly capable of employing technology. The actual design that applies to every product of Italian workers is a continuous manifestation of this natural tendency. With this premise, it is not surprising that complex mathematical simulation models have not reached in Italy the same level of

development as in other more scientific-oriented countries like the United States or America, the United Kingdom, or West Germany. In today's decision process there remains a natural Italian tendency to use free-form verbal interchange at human level as a simulation rather than to depend on the output of a machine. This tendency is accompanied by scepticism concerning the results of pure mathematic analysis especially when these are different from the intuitive, subjective perception of a problem. Scepticism finds motivation in the knowledge that data may be easily manipulated and this manipulation is difficult to control. An exception is in the economic world because worldwide trade forces homogeneity among the industrialized communities.

On the other hand, the military community fully understands the potential of technology to assess situations and trends. The proposed approach to fill this gap is a global model tailored to the military community, but this is a limited solution. The complexity of today requires something more.

For a cost-effective application of the available resources of a country the heart of the problem isn't just technological support but the kind of users. The definition of coordinated objectives and policies that develop the best national capabilities to defend the national interests requires a sound perception by the political, economical, and military leadership of the actual reality and of possible changes in the near future. It is also necessary that these appraisals and experiences be shared with the entire population in order to receive their support.



Simulation, of course, and whatever the mix of art and science might be, is not the "panacea" for national preparation and democratic coordination; but global warfare simulation may be a cohesive tool to look forward and prepare for the challenges of the future.

In current Italian situation warfare simulation is just a defense community matter.

This study highlights the need for an operational nation-level coordinated simulation. A global simulation should explore scenarios where the national interests and strategies focus, such as the Mediterranean theater, and should be played from the highest national decisionmaking level to the operational and tactical military levels. The need is not for a particular existing global simulation model, but for one that utilizes available technology without losing the human component of creativity and experience. The goal of this study is to analyze the Mediterranean theater to identify the key elements of the simulation, and to explore the highest level of models to identify whether they may be applied successfully to the particular simulation.

The identification of simulation requirements, in the context of the characteristics and behavior of the Italian users, will be the constant guideline of the present study.

Before entering the analysis both of the theater and of the samples of actual available models, it is necessary to stress that this individual study can only begin to conceptually develop a global model design and doesn't presume to present one. That

effort will be the result of a large integrated community of experts in the strategic as well as in the operational research field.

#### ENDNOTES

1. Brewer, Garry D. and Martin Shubik, "The Wargame: A Critique of the Military Problemsolving," Harvard University Press, 1979.

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CHAPTER II

THEATER STRATEGIC ANALYSIS: THE  
REALITY AND GAME REQUIREMENTS

The Mediterranean reality has something in common with simulation: both are easy to understand but difficult to define in detail.

The methodologic approach to the area analysis tends to narrow the field of interest and to fragment the issues in understandable separate parts which are easier to simulate than the overall complex reality. The focus is on crisis situations because the conflict situations are just a consequence of the crisis, and the decisions are mainly managed with quantitative data such as forces strength, fighting capability and so on. It is not to ignore the qualitative (subjective) application of leadership at all levels. It is to assert that if one may analyze the mainly qualitative results that rule the crisis situations, it will not be extremely difficult to assess the qualitative elements included in the operational or tactical warfare simulation levels.

The analysis has been conducted in consideration of the national interests since they are the common language of all nations in the international relations and they indicate the national objectives and policies.

"National interest" is not just a general concept. It summarizes a number of elements that constitute a State's compelling needs in terms of independence, security and well

being in its interaction with the other states. Table 1 lists the U.S. national interests that may be simply applied to Italy. They confirm the two Western nations basic and fundamental agreements. One may argue that Italy is not the U.S.; however, the well being of Italy is the result of worldwide economical trade that for a democratic nation without material resources implies global stability.

National Survival
Independence
Territory Integrity
Freedom of the Seas
Safety of Citizens Abroad
Economic Well-Being
Access to Natural Resources and Markets
International Stability
Containment of Soviet Expansionism
Nuclear Nonproliferation
Human Rights

TABLE 1. The U.S. National Interests<sup>1</sup>

Containment of Soviet expansionism does not fit the Italian dimension because that would imply a confrontation and a worldwide commitment too large for the Italian international role.

The national interests of a nation determine the country's approach to international interactions and may predict to a certain extent the nation's behavior and decisions in crisis situations. But it is also necessary to take into account other elements:

--The country's capability to reach decisions on short notice. Usually an authoritarian country can reach decisions in shorter time than a democratic one.

--The internal conflict in the nations internal leadership (political, economical, public opinion, etc.) that may lead to unpredictable decisions.

--The characteristic of politics and diplomacy to trade international issues demanding and conceding at the same time.

--The country's behavior to use as the primary problem-solving tool diplomacy, the military component, or both simultaneously. The military component may be used in the detente or in the intervention role.

--The population involvement and support of the country's leadership decisions, i.e., the national commitment.

All these elements influence behavior and decisions and can modify the national interests in contingency situations. Consequently they will be taken in consideration for the area countries assessment.

Without any doubt the Mediterranean Theater is one of the most complex and dynamic ones. One possible reason may be geographic, because in such a narrow area is situated the highest concentration of nations in the world. They often are of radically different development, heritage and history, and

consequently have different national interests. The possible outcomes in the political, economical, social and military arenas are so quick and changing that to manage data and issues the wargame simulation tool here becomes imperative. The national interests perspective as such, while it may explain the single countries behavior, often doesn't justify the overall scenario because it may suddenly change. The change may be due to the southern countries tendency to aggregate among them, as well as to the consequence of the superpowers appliance of direct or indirect strategy and power. The aim of this chapter is to reach a clear conclusion on the theater characteristics and on the main qualitative assumptions useful to describe and design context and scenario of the Mediterranean Theater with particular reference to the players (countries) behavior. Consequently, the analysis has been organized in the following steps:

- A first approach to the Mediterranean as a whole.
- The Italian interests.
- The other countries national interests and their aggregation process assessment.
- The NATO/Europe interests in the theater.
- The effects of local East-West confrontation.
- Considerations on the model requirements to be adherent to the Theater.

#### THE MEDITERRANEAN AS A WHOLE

Looking on a map of the world today's crisis areas there is evidence that the Mediterranean Sea is a main crisis zone.

Table 2.Crisis And Conflicts Situation(at february 1988)

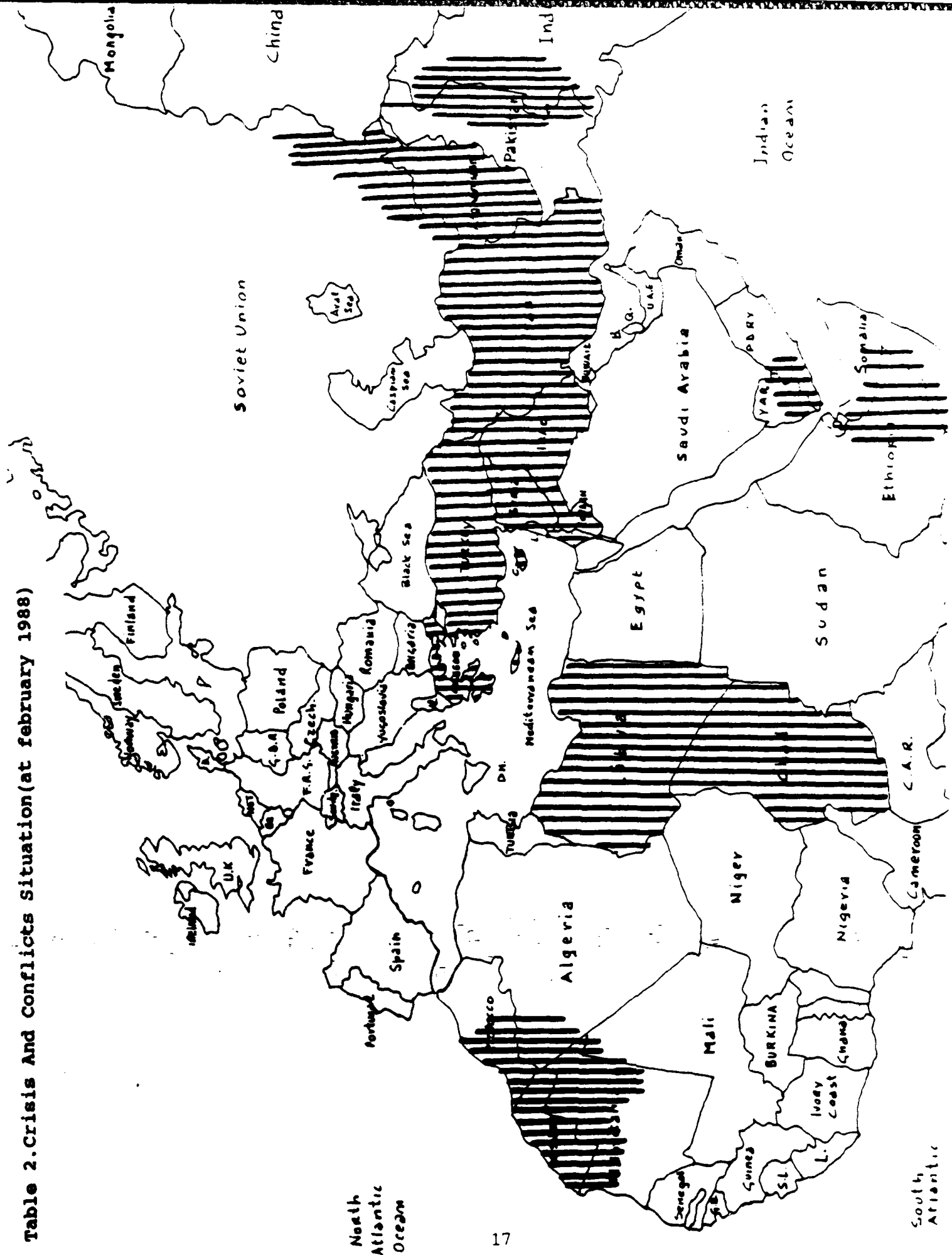




Table 2 shows the actual crisis/conflicts situation: the Morocco-Algeria-Mauritania claim of the Western Sahara land, the Greece and Turkey dispute, the Pakistan-India border confrontation, the Libia-Chad conflict as well as the Iran-Iraq one, the Lebanon self-destruction, the Israeli survival, the North Yemen confrontation with South Yemen, the Ethiopia-Somalia dispute, the Palestinian claim for a land, and the USSR protectorate of Afghanistan. This is just a local level for above it all lies a NATO-Warsaw Pact confrontation that shifts from Central Europe to Southern Europe. The beginnings of the extended conflicts have many reasons and may easily be related to the different national interests of all the local countries. The Mediterranean area is in fact characterized by two overall realities: the first is the presence of both industrial and developing nations, of countries committed to NATO or the Warsaw Pact and of nonaligned countries. The second is the greater number of factors of specific tension, caused by the behavior of local leaders in a region which is particularly sensitive to any change in political and military relations. The interaction of structural factors and causes of tension has increased political and diplomatic instability. The results have been, are, and might be local or potentially worldwide. In any case they always directly affect the Italian interests in terms of policy in the area and of economic issues. In the worst case they might call for military defense intervention.

## THE ITALIAN NATIONAL INTERESTS

The primary consideration is the importance and significance--in the U.S. perspective--of the Italian role in the region as a NATO country. A role of mediation that is well accepted from the southern nations because of its industrial capability, the fact that the Italian commitment has no post-colonial reasons and that it is a Mediterranean country.

Italy is in fact joined to continental Europe while strongly projected towards the Mediterranean. This configuration and geographical position emphasizes the two main interests of Italy while clarifying its overall area of interest:

--On the one hand there is the Atlantic Alliance, which is a link among the Western Countries. That is oriented towards Central Europe. It is possible to compare Central Europe to an extremely fortified island, surrounded by the members states main efforts and for which USA-Europe consolidated ties exist and work;

--On the other hand there is the Mediterranean area, the NATO's Southern Flank, but also a region that extends beyond that covered by the Alliance, so that the intervention of each Ally may realize directly and autonomously, and therefore calls for a close control at national level. This is at the origin and justifies the wargame simulation model that has also the intent to join in unique system the two described realities. Consequently, Italy tends to concentrate its attention on those geostrategic areas which, because of their geographic proximity or historical, economic, and cultural ties, can most affect its security.

Italy's area of interest is, in a certain way, larger than the area covered by the NATO Alliance: Western Europe is, doubtless, the core of it, but the Persian Gulf and the Mediterranean are also vital areas for Italy. If we simply proceed from a purely military point of view to the broader aspects of security at political and economic levels: energy sources, raw materials, indirect strategy, etc., we can see the vastness of Italy's area of interest.

As expressed before, the national interests of Italy almost coincide with those of the U.S., for reasons not just of a passive nature but because the democracies share the same security requirements. The difference is the objective capability of Italy to manage the international dimension and its geographical position. The Italian strategy is focused to ensure national security. The main objectives are:

- To safeguard and continue peace--both national and international;

- To guarantee the country's freedom and independence;

- To preserve and strengthen its democratic system.

Policy and diplomacy together with the economic ties work incessantly in the international arena for such objectives.

The military effort and contribution has been divided in five joint forces main missions that can be realized also simultaneously:

- North-East Defense (mainly a NATO mission);

- Defense of the South and of the naval lines of communication (NATO or national mission);

- Italian territory overall defense;

--Italian air space defense;  
--Peace and security operations (also abroad if necessary--see Lebanon mission for peace 1982-1984).

The means for the above mentioned missions are forces, characterized by good mobility and good or at least competitive level of technology with the ones of the different possible threats. The backup of the standing forces is a qualified industry of Defense and the large civilian source in terms of mobility and mobilization force. The main source for defense remains the national interest at individual level versus the development of the international situation and the consequent "will" to defend the democratic institutions of Italy.

Remaining in the military environment, these are the objectives and the means to reach the objectives. The warfare simulation model should have a principal part in the continuous process to remain able to cope with success with the possible threats. At political-military level its role should be the one to continuously explore the many "what ifs" of Southern Europe and of the Mediterranean hypothesis, to assess and play the most dangerous as well as all of the possible combinations. The final aim should be to play the predictable as well as the unpredictable and to find sound solutions at the political, military, national and international levels. The focus should be on the area of interest but always in consideration of the worldwide appraisal of possible echo and reaction.

The main issues of this warfare simulation connection among the leaderships of the country and of its military component are to contribute in the following areas:

--training and experience of the national decisionmakers versus hypothetical situations that might affect the Nation's security, reducing the surprise effect, the reaction times but moreover making evident the nation needs for peacetime preparation, adherent internal information and sound foreign policy.

--coordination of all the country's leading establishments (political-diplomatic-economical-military) for the definition of policies, doctrine and planning as well as choosing the necessary instruments.

--control of the qualitative and quantitative correspondence of the military component, that is the military capability, to the evolving requirements in terms of force structure and skill to remain able to accomplish the assigned missions and to reach the objectives.

Summarizing, a country like Italy that is fully aware of its geostrategical function as a link among Central Europe, the coastal states of North Africa and the Near East and that has an economical and political dimension of relevance, could use a global warfare simulation structure as a means to better involve all the country's strength in the continuous process that starts with the assessment of the national requirements and ends with the evaluation of the consequent capabilities.

If the Italian commitment is clear, and one may just argue on the means to better improve it, it is not so clear and defined for the many other southern countries that face the Mediterranean Sea or that are "Mediterranean oriented." Those countries constitute the gray area which action-reaction may contribute or

threaten the achievement of the Italian national interests.

### NATIONAL INTERESTS OF THE MEDITERRANEAN COUNTRIES

The first step is to define which countries should be included in the theater. Table 3 shows the countries that face the Mediterranean and has just a geographic significance.

Table 4 presents a more realistic map with the other countries which national interests focus on the Mediterranean and consequently may directly affect the area stability and the other countries security for reasons connected with their geographical position, ties, rivalry or open issues with those of Table 3. Just to remain in the geographical framework one may notice that the potential players in the theater are 36 States belonging to 4 Continents, which include both the superpowers and 5 of the 8 more developed countries in the world (U.S.-U.S.S.R.-Japan-West Germany-Italy-U.K.-France-Canada). This is sufficient to appreciate how East-West confrontations and economical reasons play a primary role in the region. Not considering Italy or the U.S. and U.S.S.R. which will be examined later, let's focus on the remaining countries considered as single nations, that is, without taking into consideration their aggregate strength and capability.

Up to now, there have been presented many elements that are closely tied with national interests and with the capability to

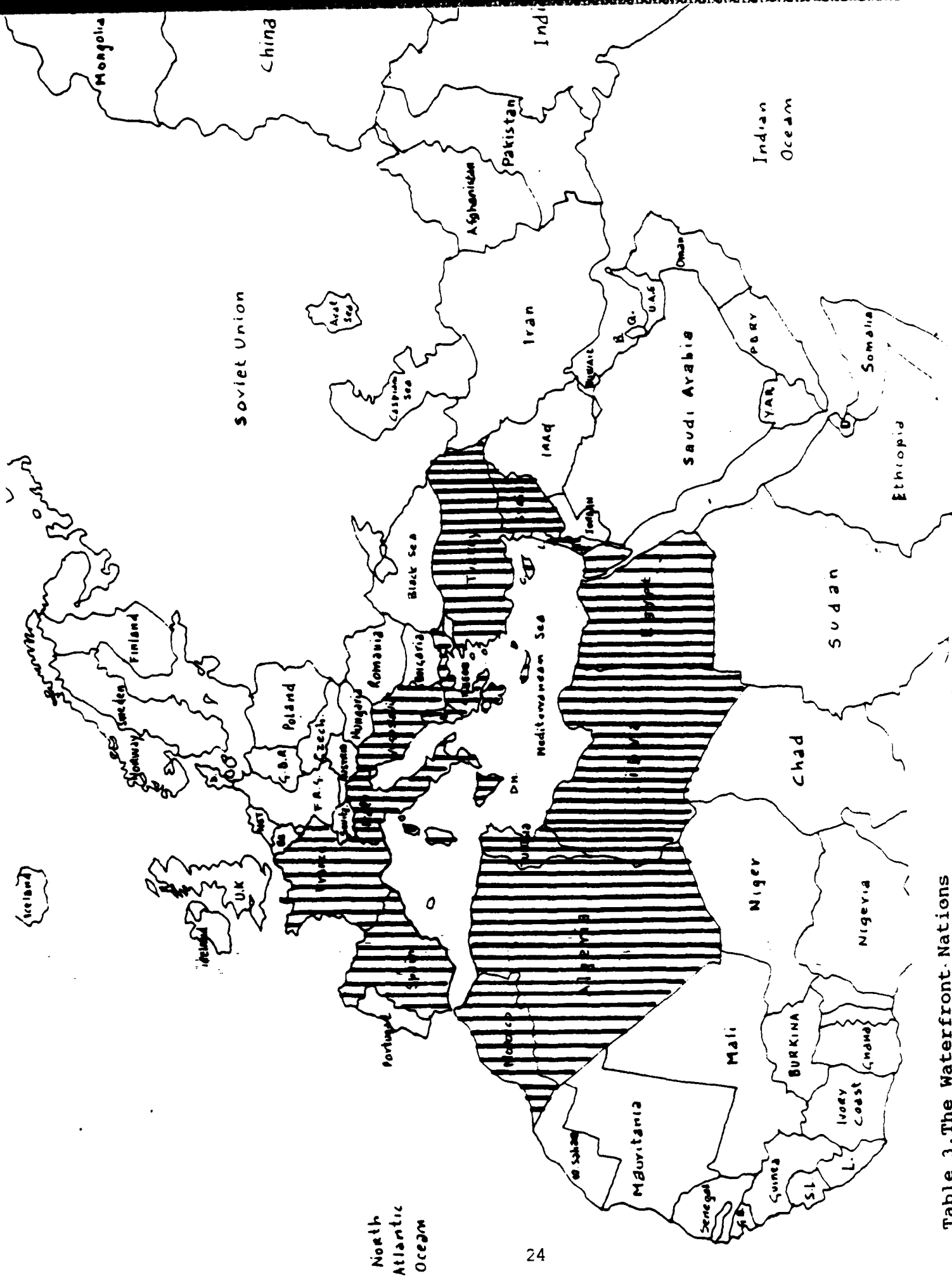


Table 3. The Waterfront Nations

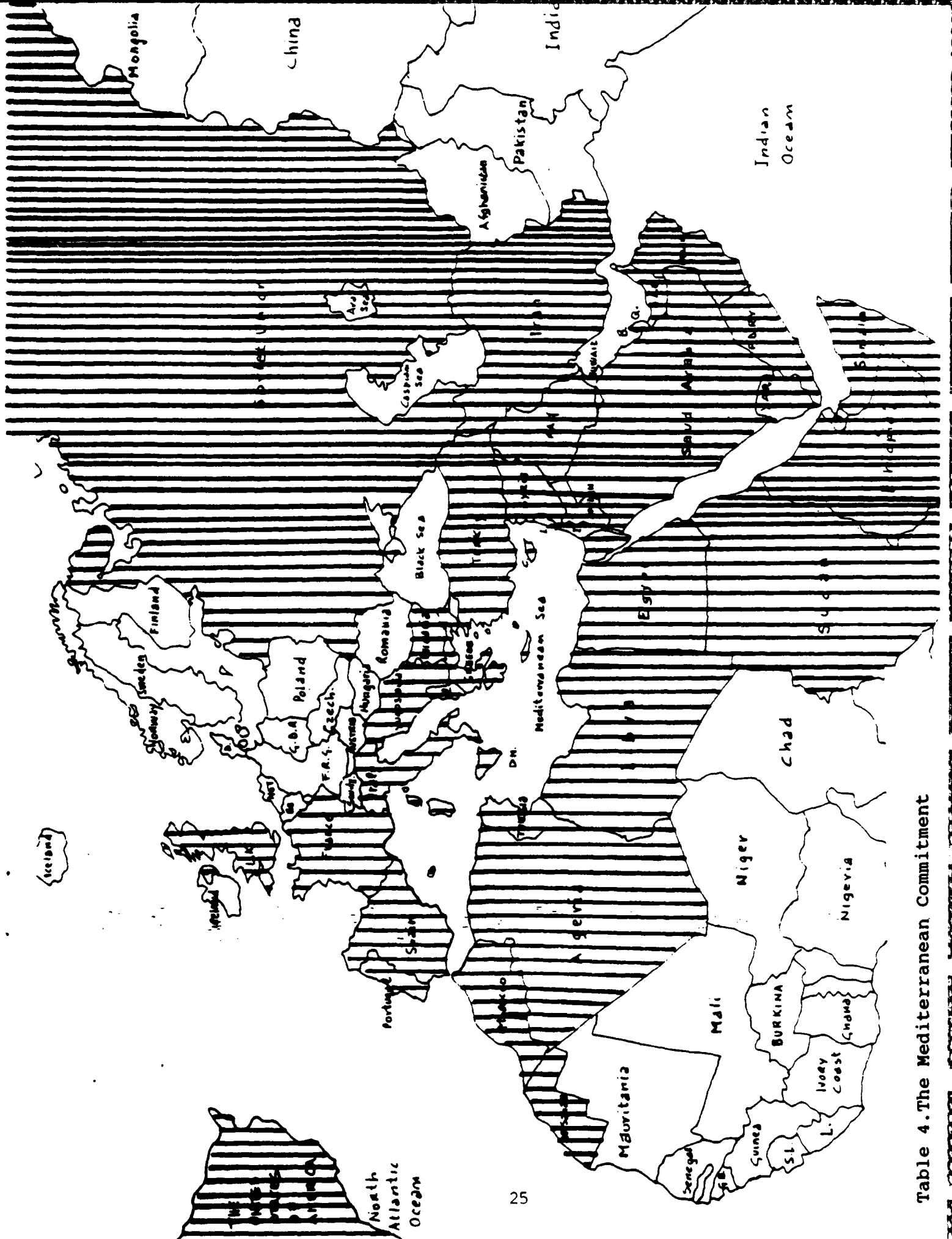


Table 4. The Mediterranean Commitment



defend them. The countries assessment has been realized giving consistence, country-by-country, of these elements. All the countries have been considered at the same level of interest, despite their potential, because all of them have demonstrated in the past to be able to originate large scale crisis and reaction. Table 5 summarizes the results, which as said before, are not complete.<sup>2</sup> The elements selected and the following results may widely be discussed. It is, moreover, to say that the results may change in the short period because continuous change is a constant in the region and may be interpreted as the southern countries effort to insure dynamic area stability in situations of local instability.

The results allow some general considerations:

--the presence in the same area of many countries completely different in the basic elements that affect and define national interests.

--the presence of many and for different reasons active countries that consider change as a goal.

In the world of crisis and conflict situations these countries--in particular Algeria, Iran, Libya, and Syria--should receive particular attention because they may be considered the local players who try to exploit the numerous inner potential crisis for their own objectives, adding instability in their region where also the superpowers' behavior is mainly characterized by similar policy.

Looking at the countries characterized by radical change commitment and by active role in the region one may reach two conclusions:

[illegible]

**Table 5. National Interests Elements Evaluation.**

**YES**

**NOT**

--Unlike Israel, concerned for survival, and Iran that tries to extend its religious-based mode to the other islamic countries, the other more radical ones are authoritarian, socialist, and at some extent tied with U.S.S.R.

--the need for change or for active role in the region is a result of the unaccepted presence of Israel, of historical heritage, of region issues and of the Soviet Union influence.

Regarding the Soviet Union influence one may say that it exploits the U.S. and the National European countries behavior and approach to the region that is mainly characterized by the goal of preserving the status-quo to maintain stability, so that the local countries that want to change align with the U.S.S.R. as a consequence.

The results of Table 5 may be of interest for an area first assessment as well as for the one-to-one country relations but from a warfare simulation perspective, based on interdependence and action-reaction, they are insufficient. It is in fact necessary to also consider the internal groups of the single countries that may lead to crisis situations (terrorist groups as an example), the real capability of the formal countries to manage and control these groups, and the international connection in terms of natural and formal alliances among the single countries. At this point, of course, the perspective of national interests becomes more flexible, because each country has a different potential to lead the others and to reach temporary agreement.

Agreement in the theater can be reached, as shown in the past, for political, historical (heritage), economic and

religious reasons. The Tables 6, 7, 8, and 9 show the fundamental possible grouping of the local countries in those perspectives. Looking at the various aggregation situations one may say that some of them widely change in the different perspectives (see Iraq, Iran, Libya, Algeria, etc.). To check this consideration with the recent past one may say that political opportunism is a constant in the southern part of the theater, is at the origin of change and, as said before, is a consequence of the continuous national effort to balance the internal and local threats as well as to preserve the area stability. This statement has many consequences. The first is the limited influence that both U.S.S.R. and the U.S. can reach in the theater. The second is the behavior of local southern players to accept political change of neighbors and allies without concern. The third is the completely different political relationship in the European part of the theater. The fourth is that consequently, the Arab heritage, the economic and the religion connections seem to be of more strong and durable ties. The economic influence alone has not proved resistant enough to control radical behavior and decisions in crisis situations (see Iran-Iraq War). Meanwhile respect and consideration is given to the rich countries (see Saudi Arabia) who are able to provide concrete help to the others, quite apart from its political orientation.

In an area that has always been characterized by the natural tendency for trade and bargain, the aggregation process must be seen at different levels and with different capabilities in terms of influencing the states behavior and decisions.

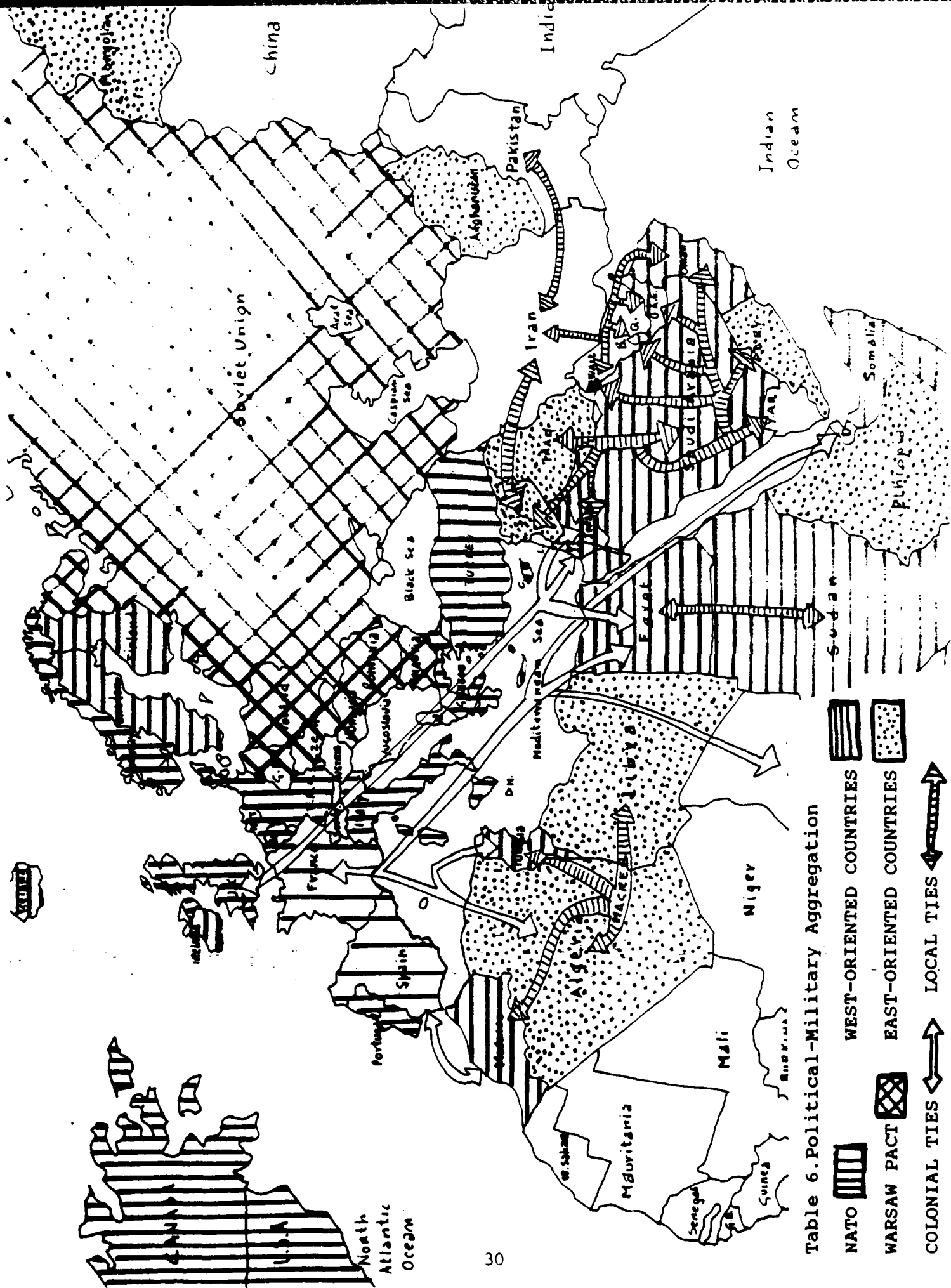


Table 6. Political-Military Aggregation

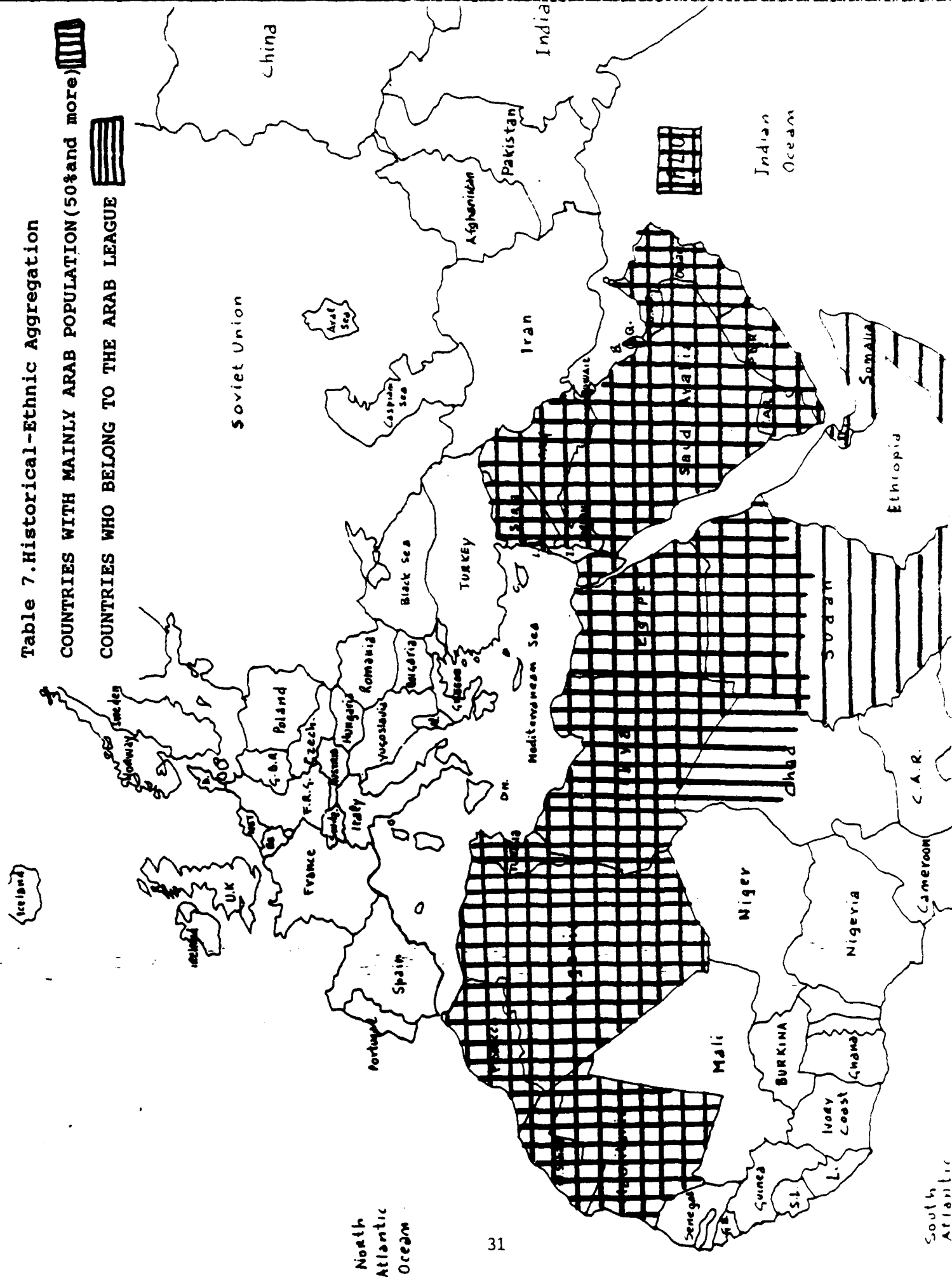
NATO	WEST-ORIENTED COUNTRIES
WARSAW PACT	EAST-ORIENTED COUNTRIES
COLONIAL TIES	LOCAL TIES

Table 7. Historical-Ethnic Aggregation

COUNTRIES WITH MAINLY ARAB POPULATION (50% and more)



COUNTRIES WHO BELONG TO THE ARAB LEAGUE



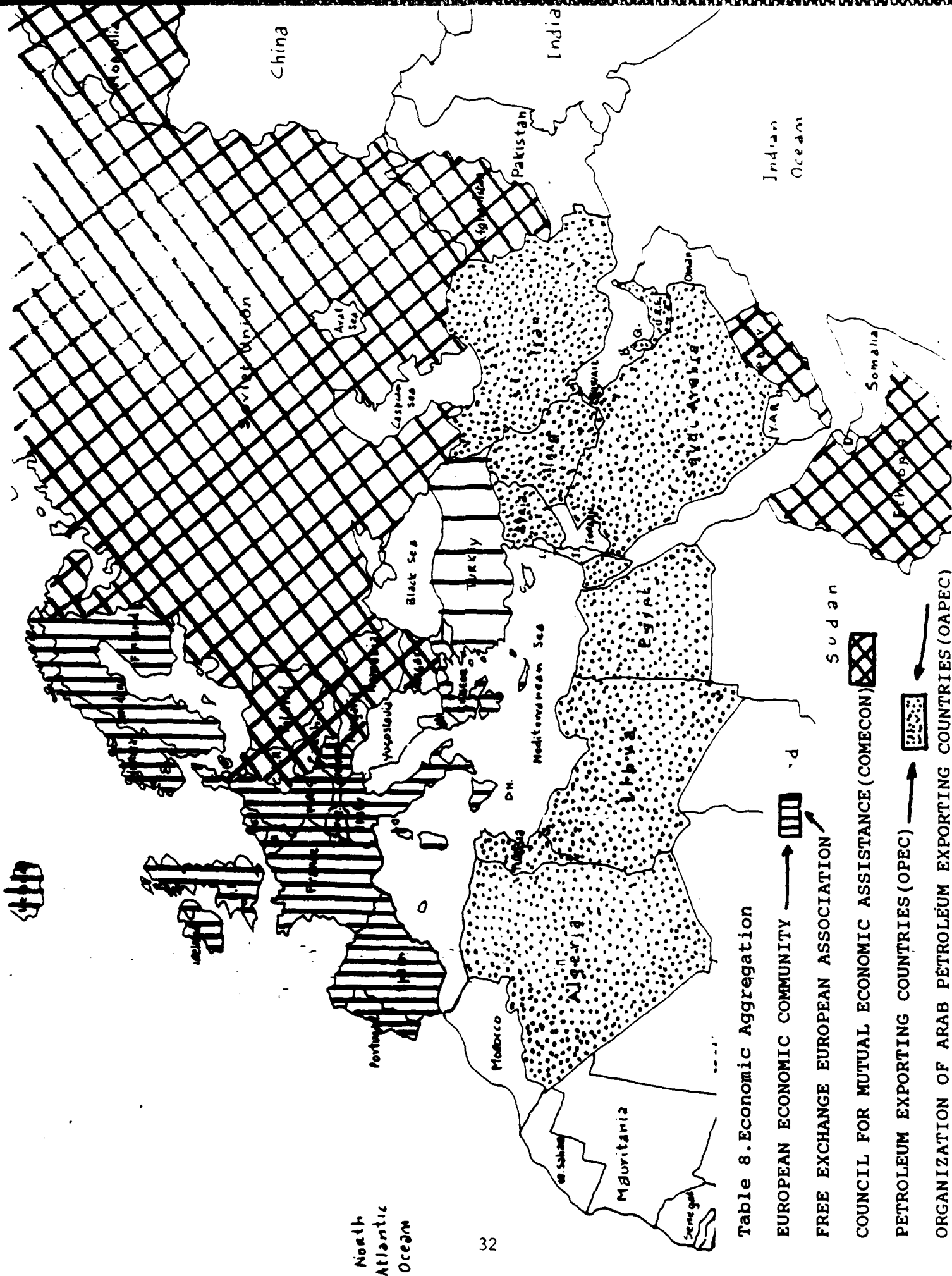


Table 8. Economic Aggregation






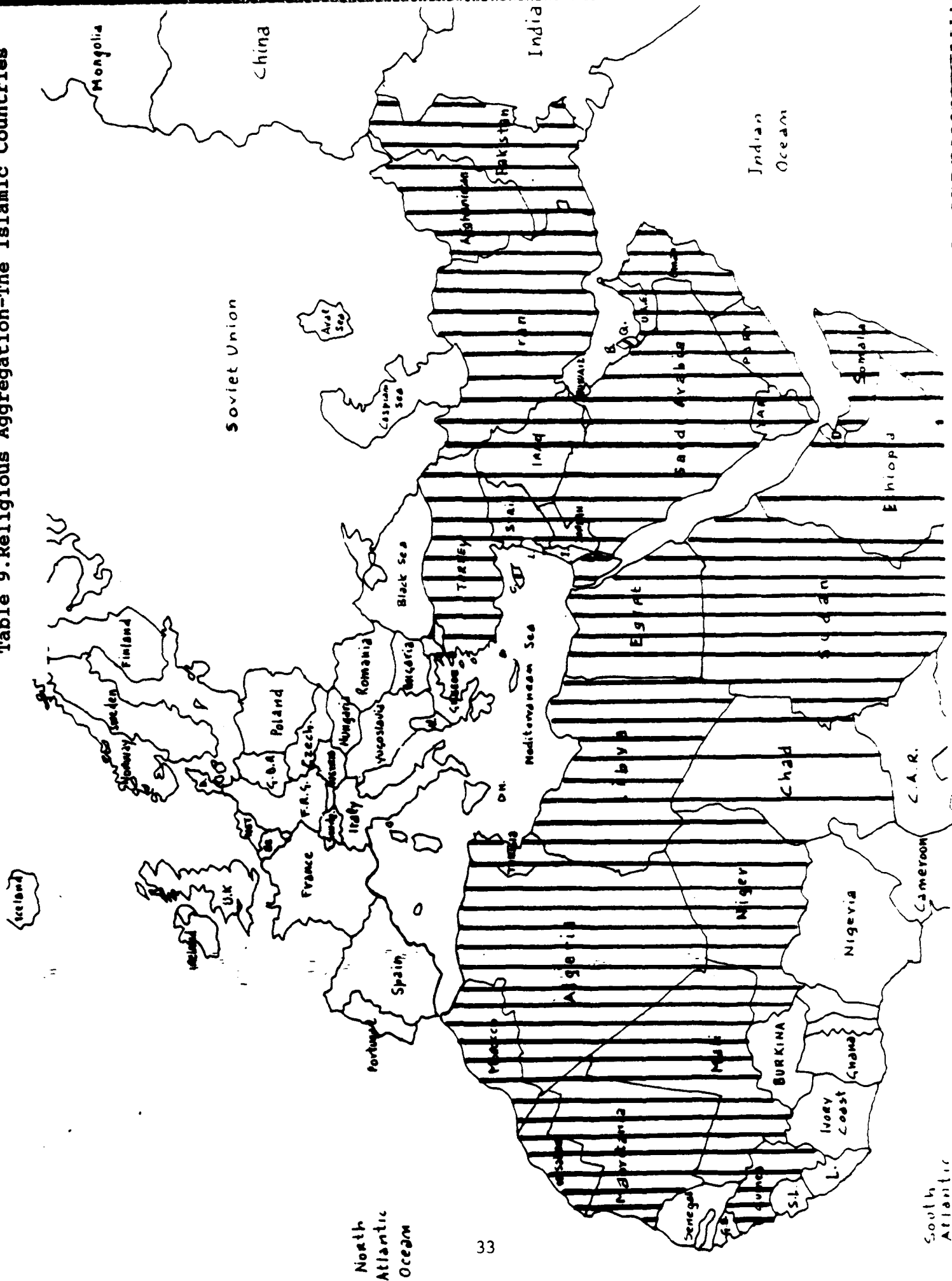
EUROPEAN ECONOMIC COMMUNITY →   
 FREE EXCHANGE EUROPEAN ASSOCIATION →   
 COUNCIL FOR MUTUAL ECONOMIC ASSISTANCE (COMECON) →   
 PETROLEUM EXPORTING COUNTRIES (OPEC) →   
 ORGANIZATION OF ARAB PETROLEUM EXPORTING COUNTRIES (OAPEC) → 

Table 9. Religious Aggregation-The Islamic Countries





The stronger influence, as Israel well knows, seems to be the Arab heritage, followed by national economic value, together with a united national society often tied together with religion. The political aggregation comes last.

Religion and radicalism, together with a lack of economical support is not enough. Consequently, the Iranian effort to be the center of attraction of the area has no effect, mainly because religion is not the first element of aggregation and because Iraq, the enemy at the moment, is an Arab country who belongs to the most important aggregation component. Consequently, the Pakistan approach to Iran should not be seen as the first step towards the Islamic union but as a result of the Afghanistan experience. Pakistan is trying to balance its own unfortunate geographic position and tends to align with a neighbor that has at least religion in common.

If this assessment is accepted, a relook at Table 5 may consent to rank the level of local leadership in the southern part of the theater and to better understand why little or large room is given to all of them (with particular reference to the more active countries) to act as important players.

As an example, the Jordan role remains limited because of its reduced economical strength, in spite of first class diplomacy and one of the more professional military forces in the region. On the contrary, the Libyan aggressiveness and inconsistency is tolerated from the neighbors because of its presence in all the groupings that have real influence on the development of the local relations.

One may also understand which are the more vulnerable points to exploit if one wants to wreck and/or manage their behavior. For example, to wreck the local leadership of a country (see Libya) may have a better result than reaching a political agreement. In this perspective, while the Israelian role for peace in the region always contains crisis seeds because it is played in the military dimension and against the Arab heritage, the Saudi Arabia leading role fits the local environment more (Arab, Islamic, welfare country with active role) and, as shown in the past, constitutes an important element to defuse crisis situations. Among the Northern countries and for different reasons (rich, peaceful, nonexpansionist, noncolonial power) Italy may play a sound mediator role for Europe and NATO.

Summarizing, the key elements that can derive from the analysis of context and possible scenarios at this stage of research are the following:

- The Southern part of the theater is characterized by political change, collective process in problem solving (first arab, than economical and religious) and often radical behavior as a consequence of national character and authoritarian leadership. The application of power may be by standing forces and or by terrorism.

- The Northern part of the theater is mostly democratic and makes large use of diplomacy in crisis situations.

- Expansionism is limited to Libya mainly as a consequence of the leader's personality and ambitions. Elsewhere the internal problems, the standing crisis, the development process and the search for local stability focus the players attention on the

proper boundary more than versus a possible new dimension of the theater (arab confederation, Islamic gathering and so on).

- Both the superpowers found a good terrain for interaction in the theater. The objectives that can be reached are limited because the local players, with particular reference to the southern ones, are not politically committed, moreover, they have the natural capability to continuously assess the limits of their action to avoid general instability in the Mediterranean. The same concept applies to the former European colonial powers (France, UK).

- Communism as a world committed religion and life does not find a good terrain in the southern and more vulnerable part of the theater both because the religious commitment is completely filled by Islamism--that also is a model of life--and because of the local attention to preserve authoritative leadership and welfare to the leading groups in the countries. The final consideration on the local southern approach to the East-West dimension is the feeling that superpowers are more used than trusted.

Focusing more on detail on the researched warfare simulation model, one may say that:

- crisis situations are always more frequent because often the end of one crisis generates the scenario for others.

- crisis situations are often of limited amplitude; their level mainly depends on the exploitation effort applied by local active countries and by the USSR.

- the number of players is greater than the one of the formal states because the multiaggregation process has originated

active and radical groups internal to the countries or spread in larger areas inside and also outside the theater.

- the southern states behavior may be largely considered unforeseeable because of the many components and elements that may modify it, first of all personnel leadership.

- the northern democracies behavior as well as the one of the superpowers is more predictable because it is the consequence of a more simple and clarified decision process.

- the number of qualitative and quantitative data required to analyze and to play the theater drives two considerations: the first is the necessity to simulate the large number of players at politico military level with human components characterized by high level of knowledge of the national, groups of power, alliances situations and behavior. To try to substitute the players with artificial intelligence is an effort without result because not only the number of players is wide, but the leaders may change and the scenarios are subject to continuous change, while artificial intelligence, as will be seen in the next chapter, needs a certain range of predictability. The second is that to manage the great number of quantitative data that the present analysis has underlined it is necessary to have significant computer support. If a conclusion may be reached at this point of the research it is that warfare simulation in the theater should focus more on crisis escalation control and overall area stability than on the simple issues, because they are always present. That is play selected critical crisis and conflict situations, more than all the endemic crisis that, on the contrary, should be part of any game scenario. As

an example, to play situations that consider Malta or Turkey under Soviet Union influence should be more interesting in terms of outcomes than the Palestinians and Israel confrontation.

#### NATO-EUROPE INTERESTS

The NATO-European countries interests overlap in some extent and are clear enough.

- Defense and security, as a consequence of the so-called Southern flank of NATO and as a stabilizing response to southern turbulence and behavior.

- Assured access to the energy and raw material supplies, essential for the Northern European sophisticated industrial production.

The interests are consequently mainly economical and military while political intervention is just the consequence of their defense. That is, that natural ties almost do not exist, that there is not, usually, natural agreement between Northern and Southern countries of the Mediterranean. This is a first gap in terms of area homogeneity to whom it is necessary to add the other evidence that NATO does not have complete jurisdiction on all the theater.

The geographical boundaries within which the North Atlantic Treaty operates were recently extended after Spain's entry into the Alliance, and are defined in detail in Article 6 of the Treaty. While the Mediterranean is certainly included, the area around the Tropic of Cancer, from North Africa to the Arabian

peninsula is totally excluded from the Alliance's area of jurisdiction.

The concept is obviously a result of the period in which the Treaty was signed.

It was a period when, amongst the European countries, only the U.K. and France could commit themselves world wide and in which the Soviet Union could not materially exercise a credible military threat outside the Eurasian continent.

But since then many changes have occurred. Today it is not a question of extending the geographical boundaries of NATO. It is, on the other hand, a question of improving the consultation process, enhancing its characteristics until one reaches a stage where there is effective coordinated management of all crisis situations. One must even envisage the use of forces under national control as in the Lebanese experience or in the French intervention in Chad.

From the warfare simulation model perspective this calls for a simulation process extended and coordinated within the NATO framework that is a NATO warfare simulation center linked to the national center, natural homeland of the model of interest in this study.

#### EAST-WEST CONFRONTATION IN THE THEATER

Some of the issues of this strategical level have been discussed before, essentially in terms of natural limitations.

For a more complete assessment of the superpower behavior it is useful to summarize the possible national interests of both the superpowers in the theater area or issues.

- NATO interests
- Stability and security of the region in the of the U.S. worldwide commitment
- Free world access to the oil resources
- Deny Soviet Union access and influence in the region

TABLE 10 - The U.S. Interests<sup>1</sup>

- Indirect strategy to hit the west's weak points without the overt use of military force
- Freedom of access to and from the Black Sea
- Counterbalance the U.S. naval presence in the Mediterranean
- Control of an international area to be used as a base for a military threat to Europe
- Political presence to open the way to local initiative and ambitions, with particular reference to southern waterfront nations.

TABLE 11 - The USSR Interests<sup>1</sup>

Summarizing, the superpowers attention to the southern part of the theater may be depicted as a play for strategic advantages. The main difference seems to be that the U.S. defends the initial advantages while the USSR attacks to better balance the local confrontation situation. Both of them seem to be fully aware of the limitation of their policy to fully annex the local players and of the fact that the economical threat (supplies) is a threat first for the oil, raw materials producers economy. On the other hand both understand the military potential of the region in the NATO-Warsaw Pact perspective and as a crisis area that affect the superpower elsewhere in their worldwide commitment.

What seems to be not very clear is that the local players, under the shadow of the superpowers, have grown in their self-confidence to such an extent that they are no longer controlled or contained. The superpowers have been more and more directly involved in the local disputes, as the Kuwait ships reflagging demonstrates. This evidence is full of dangerous consequences in terms of crisis and conflict escalation. More important is that, to some extent, the U.S. and U.S.S.R. behavior today may be modified or influenced by the southern players and not reverse, as it was in the superpowers original intentions.

#### MODEL REQUIREMENTS

The first result of the analysis conducted on the theater is that the Mediterranean, although complex, deeply populated and highly interactive, is not the kingdom of subjectivity,



unpredictability and risk as it seems if seen as a whole. There are rules that manage the international relations of the different countries; but these rules don't have the same weight and result for all of them and may differ, country by country. Moreover, the analysis in the perspective of national interest has added rationale and sometimes justified the behavior and decisions of the players, while underlining some of the reasons that are at the origin of the endemic crises and conflicts in the region.

The main realities of the theater remain change and interaction. Both of these demand a continuous dynamic analysis that only simulation methodology, together with computerized support may make more manageable in real time.

The results of the analysis of interest for the wargame simulation model and scenario are summarized in the following tables (12 and 13) that collect, respectively, the theater characteristics and the basic elements of the player's behavior. These are data of great importance for the researched model design. In the first chapter the fundamental elements of a wargame structure--objectives, scenario, data base, and so on--have been described. Giving order to the theater analysis outcomes, it is possible to identify the model requirements to effectively simulate the Mediterranean dynamic and possible events. These requirements have been summarized in Table 14 which constitutes the final output of the research conducted in Chapters I and II.

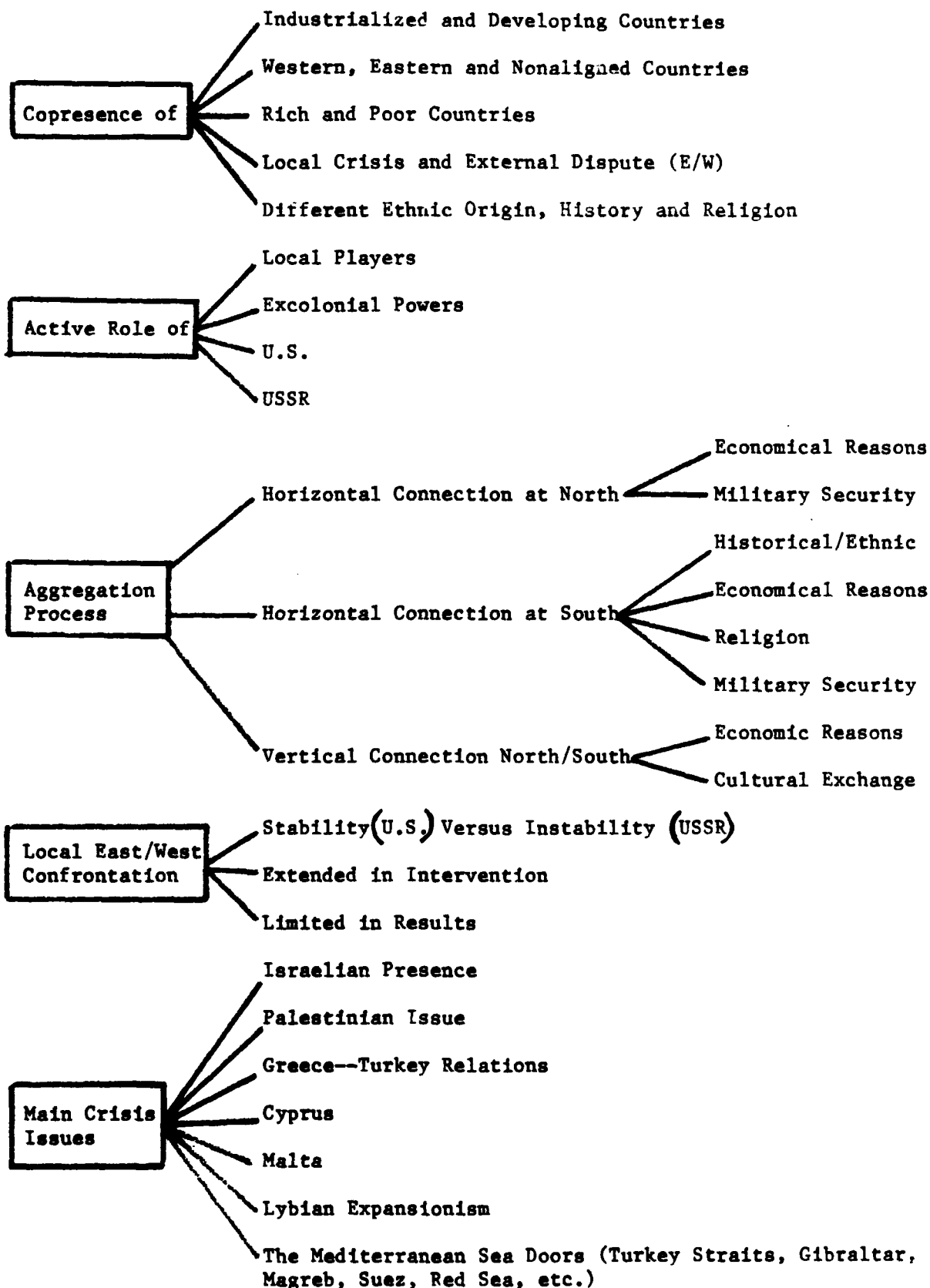


TABLE 12--THEATER CHARACTERISTICS

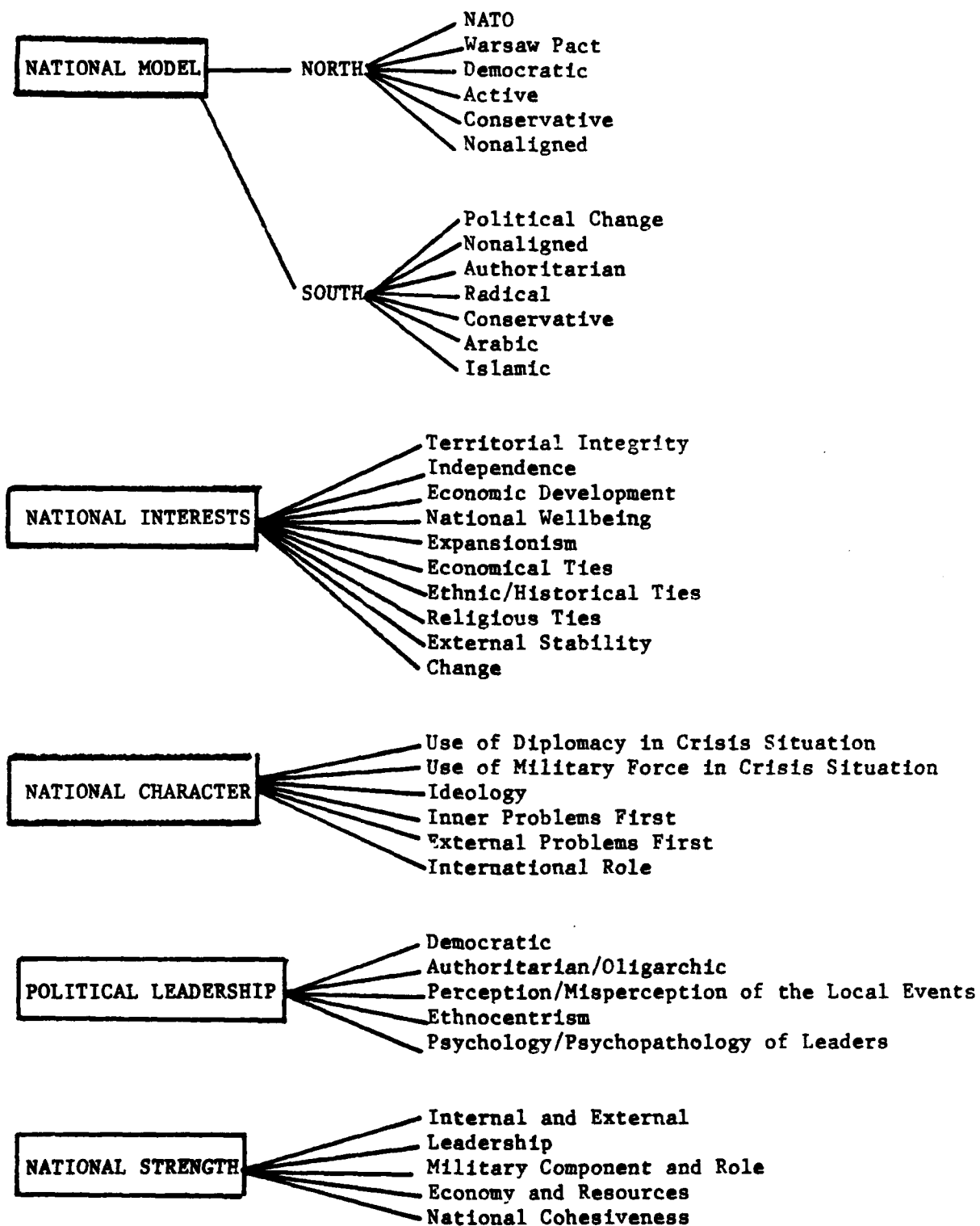


TABLE 13--PLAYERS BEHAVIOR ELEMENTS

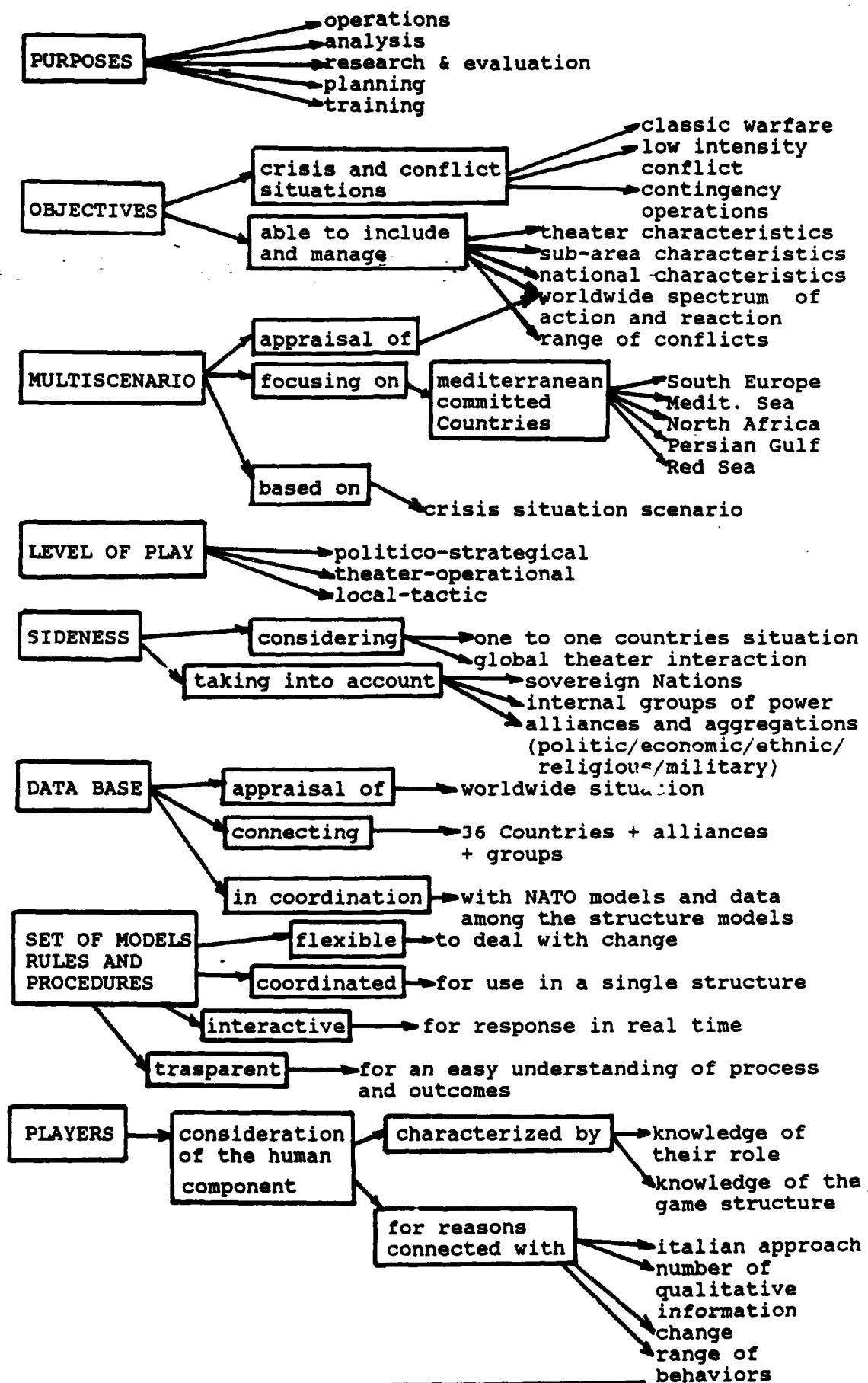


Table 14. Warfare Simulation Model Requirements

#### ENDNOTES

1. As presented during "Course 5" of the USAWC Academic Year 1987-1988.

2. The data used for the assessment and the evaluation come from "Kaleidoscope, Current World Data" and "Deadline Data on World Affairs," 1987.

AN ITALIAN PERSPECTIVE OF WARGAMING IN THE MEDITERRANEAN:  
REQUIREMENTS AND POSSIBILITIES FOCUSING ON THE U.S.  
STATE OF THE ART

CHAPTER III

THE U.S. STATE OF THE ART: THE ACTUAL AND FUTURE CAPABILITIES

"The computer has quantitatively enlarged the sort of calculations and experiments an individual scientist can take on in his lifetime, but, as far as I can tell, it has, on its own, created nothing."

Jeremy Bernstein,  
"When the Computer Procreates"

SITUATION ASSESSMENT

The U.S., together with Canada, Australia, Federal Republic of Germany, and the United Kingdom, have used simulations for quite a long time and they work in a coordinated exchange of information mode.

In the use of technology, research and development, the U.S. is already ahead. Consequently, the capabilities analysis is conducted mainly on the U.S. models.

The simulation environment in the U.S. consists of universities, international study institutes, government agencies, armed forces agencies and schools and industries. Producers and users work together to formulate better solutions. Thus, there is a continuous exchange of experiences. The effort is focused on more simple and least expensive methods. The main part of simulations have defense purposes. Table 15 summarizes the major applications of simulations in various aspects of models, man-machine games, manual games and analyses.

The defense simulation organization<sup>2</sup> is summarized in Table 16. In terms of Services, today the main attention is focussed on joint warfare simulation models, with the Army and Navy playing the more active role. The Air Force uses simulations for technical evaluations and air battle outcomes. The Navy's main simulation center is at the Naval War College, where global games bring together players and observers from all agencies and military services in the U.S. government including academicians, scientists, and engineers. Up to 350 players are involved, divided into teams representing national leaders, theater commanders, fleet commanders, land force leaders, and allied nations.

- Technical Evaluation
- Doctrinal Evaluation
- Force-Structure Evaluation
- Analysis of Military and Diplomatic Factors and  
International Relations
- Analysis of Military, Political, and Economic Factors,  
including Domestic Relations
- Training and Education
- Development of Research Methodology
- Planning Evaluation

TABLE 15--THE U.S. USE OF SIMULATION<sup>1</sup>

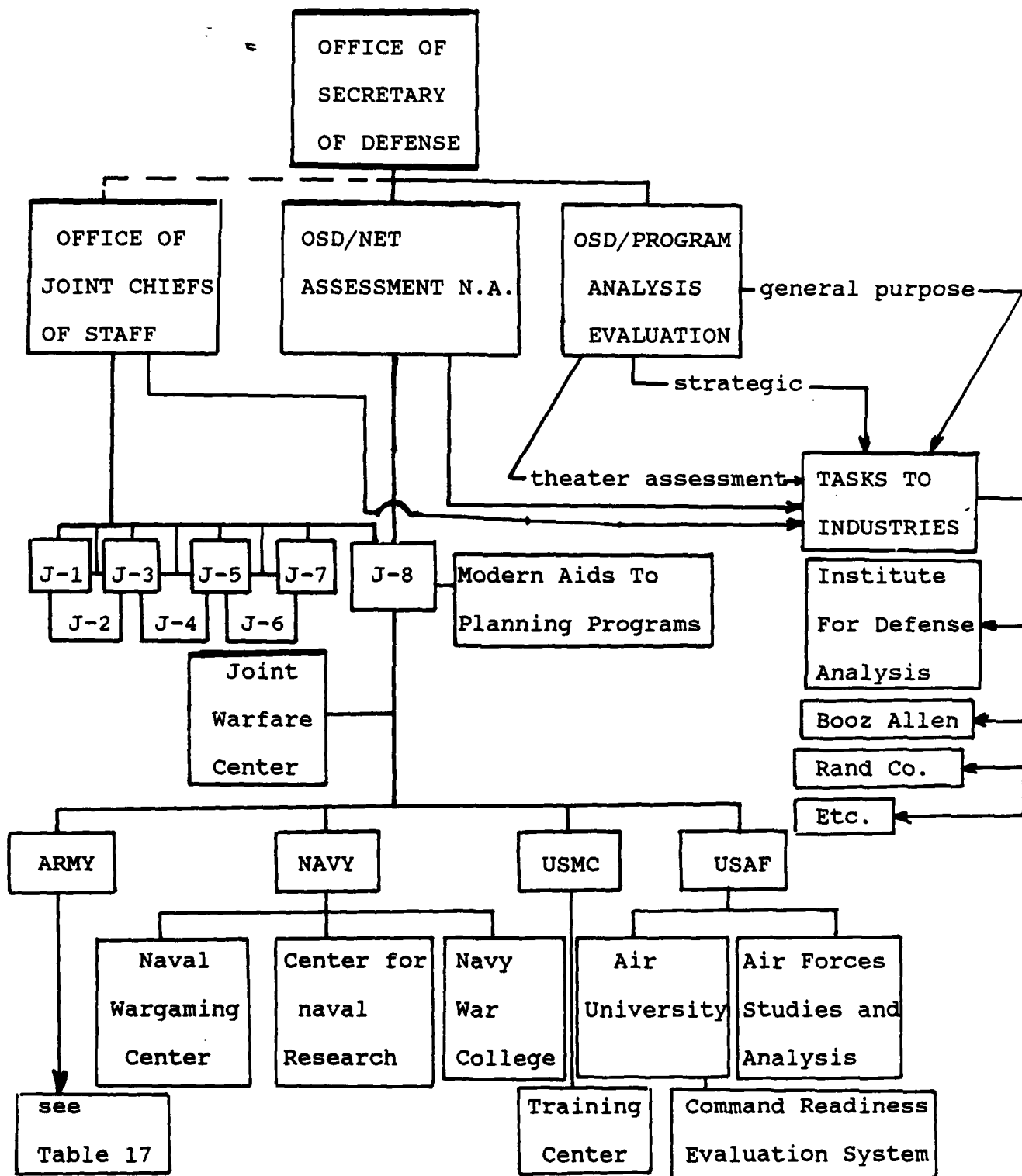


Table 16. Defense Simulation Organization(2)



The Army organization<sup>2</sup> is depicted in Table 17.

Inside the Army, TRADOC (Training and Doctrine Command) is the command responsible for identifying, evaluating and introducing wargames into the scene with primary responsibility for those used for analysis, teaching and training. AMMO (Army Model Management Office) is responsible for the Army's overall analytic capability to provide a consistent basis to support decisions. Both of these organizations interface and mainly utilize the same data base. The main Army models, their level of play and their main use<sup>3</sup> are summarized in Table 18. Red color depicts the ones that, together with Policon (politico-military level), will be examined to assess the actual simulation capabilities at the different levels of play.

#### POLITICAL-MILITARY LEVEL MODEL: POLICON

This game is played inside the Conflict Analysis Center at the Concept Analysis Agency (CAA), where the overall mission is to examine potential conflicts throughout the world, focusing on nonmajor theaters. The aim is to explore the political-military context of conflicts, wargaming all hypotheses and giving outputs in terms of U.S. force deployment issues.

POLICON<sup>4</sup> is a political interest group analysis model that employs the concept of expected utility to arrive at a prediction of political decisions. It takes into account risk and third party contribution and, in addition to providing an outcome

MISSION	ORGANIZATION
TRAINING	ARMY WAR COLLEGE (STRATEGIC/OPERATIONAL)
	COMMAND & STAFF COLLEGE (OPERATIONAL/TACTICAL) @
	SCHOOLS AND CENTERS (TACTICAL) @
ANALYSIS	CONCEPT ANALYSIS AGENCY (CAA) (FORCE STRUCTURE/PLANNING)
	TRADOC-FLVN (GAMES AT CORP/DIVISION LEVEL) @
	TRADOC-WSMR (GAMES AT BRIGADE/COMPANY LEVEL) @
OTHER PURPOSES	ARMY MODERNIZATION MANAGEMENT OFFICE (AMMO) @ (MODELS MODERNIZATION)
	ARMY MODEL IMPROVEMENT PROGRAM (AMIP) @ (HIERARCHIZED MODELS)

DEPEND ON TRADOC - @

TABLE 17. U.S. ARMY ORGANIZATION<sup>2</sup>

FUNCTIONAL  
AREA  
SIMULATIONS

AUTOMATED  
ANALYTICAL  
SIMULATIONS

INTERACTIVE  
ANALYTICAL  
SIMULATIONS

INTERACTIVE  
TRAINING  
SIMULATIONS

COMMAND  
LEVEL  
MODELED

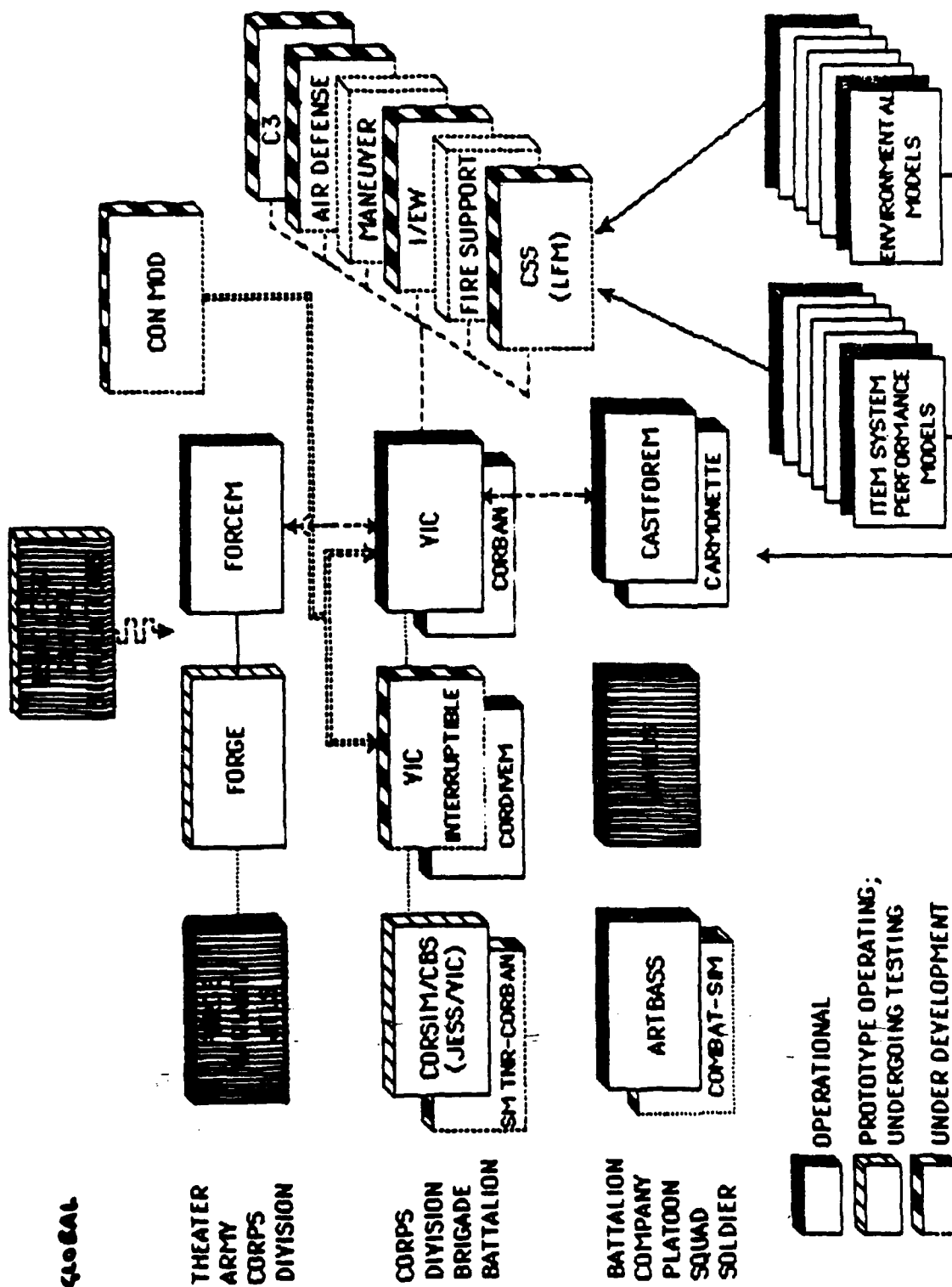


Table 18. Main Army Models (3)

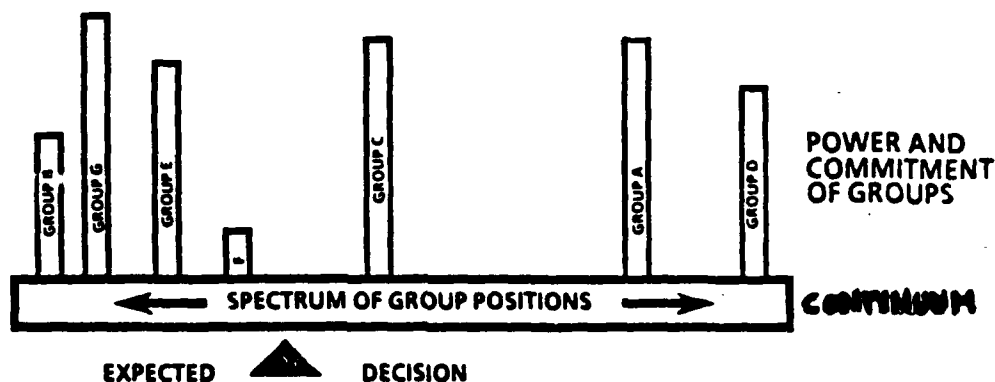
prediction, permits analysis of the stability of the likely decision and the probable interactions among the groups involved. Table 19 provides an overview of the POLICON Model.

**PERMITS: AN ASSESSMENT OF POLITICAL INTERACTION AMONG INTEREST GROUPS ON A SPECIFIC ISSUE**

**BY USING EXPERT ASSESSMENT OF:**

**INTEREST GROUP:**

- POSITIONS
- POWER
- COMMITMENT



**TO PROVIDE:**

- PREDICTED POLITICAL OUTCOME ON THE ISSUE
- ANALYSIS OF PREDICTION STABILITY RISK
- ANALYSIS OF INTEREST GROUPS

**TABLE 19: THE POLICON MODEL**

POLICON can be used to predict internal political decisions related to defense makers (ex. whether to send a peace force to a crisis/conflict area) or alliances or groups of final decisions on a disputed matter at the political level. All inputs to the model are provided by subject matter experts. This is done in the form of judgements on interest group identification, position, resources or power and degree of interest with respect to a given issue.

POLICON provides a forecast or expected outcome for the issue being examined. This is simply an average of group positions weighted by their power, salience, and risk posture. In other words, it is the center of mass or balance point of the various groups.

POLICON also provides a snapshot of the political environment which allows an assessment of the stability of the forecast (expectation that the policy forecasted will continue) and how much each interest group favoring a change expects to win or lose. This allows analysis of the likelihood of a struggle and the degree and direction of any resulting change.

Summarizing, POLICON is a useful tool for analyzing a broad range of policy issues both in an international and internal context. It has achieved a high success rate in predicting political outcomes. The strength of the model lies in the wide use of human experience and in its structural simplicity. The weakness, in structural terms is that complex policy issues (interactivity) whose possible outcomes do not lend themselves to representation on the linear continuum, cannot be addressed. This constraint related to the requirements of the Mediterranean theater model means time to address one issue at a time and to conduct a step by step analysis that does not seem compatible with the need to assess quickly regional and local situations and possible countries behavior and decisions. On the other hand, in a free form interchange politico-military game, like the ones played at the Naval War College, may be a reliable, analytical tool to examine the more controversial issues.

Assume that in the model to be built the political-strategical level of decisions are reached as stated above, with the analysis of the two following U.S. models, JTLS and JANUS, one descends into the lower levels of play and one enters completely in the military dimension.

#### JOINT THEATER LEVEL MODEL: JTLS

JTLS<sup>5</sup> is a highly interactive computer-assisted wargaming system at theater level which models two-sided air, ground, and naval combat. It can be used for warfare training, joint operational planning, and doctrinal analysis with an emphasis on rapid production of results. The model is theater-independent and does not require a knowledge of programming. It is a part of the JCS Modern Aid to Planning a Program (MAPP). The established goals of the JTLS development effort that constitutes the main characteristics of the model are:

- develop a tool that can be used for warfare training, combat analysis, joint operational planning, and doctrinal analysis.

- provide functional visibility in order to facilitate model validation.

- incorporate specific user requirements.

- provide an enhanced user-machine interface.

- provide a baseline system that can be expanded to a graphics-assisted planning and analysis model.

In fact, the simulation has been created without precoordinated data within the program logic, permitting potential users to

employ the model at any theater and at any level of security classification.

Consequently, the model is characterized by five operationally sequenced phases:

--Initialization: Those actions which must be accomplished in advance in order to set the stage or scenario for a war game.

--Preparation: Development of user-oriented items that directly affect succeeding phases of the game.

--Execution: A phase to assess the effects of the strategic and tactical plans developed in the two previous phases. Interaction within the combat simulation is accomplished by issuing orders to the available military forces.

--Restart: The capability to reset and restart the system following either a planned or an inadvertent interruption.

--Analysis: This phase provides insight into the issues under study and allows the refinement of study objectives."

JTLS is a modern simulation tool that has structural model limitations. In fact it is still a "simple model" that considers the average of human personality and performance instead of "0-to-maximum capability" options and deals with system performance instead of "system + human performance." In synthesis, it simplifies the scenario omitting details, aggregating qualitative issues and playing with quantitative elements. This means limitations in human factor appraisal and weight in the play. On the other hand, it uses the best technology available to coordinate, assess and visualize the data outputs in a short period of time.

One may say that JTLS uses a traditional approach while it is able to manage at best the organizational and executive parts of the play.

#### TACTICAL LEVEL MODEL: JANUS

JANUS<sup>6</sup> is an interactive, two-sided ground combat brigade level simulation model that utilizes dynamic graphics representation. The JANUS code provides detailed treatment of nuclear, chemical, and conventional military systems and digitized terrain. Players make tactical and system employment decisions using interactive graphics based upon a continuous presentation of a map-like display and on-call status report. The model is used to evaluate nuclear weapons concepts and the interaction of the tactical maneuver elements under conventional, chemical and nuclear conditions.

The model focuses on individual fighting system engagements and assessments with aggregation capability up to company sized elements and at this level any kind of war situation play (classic-contingency-close combat and so on) can be done. The JANUS code is event-sequenced, runs in near real time, and uses probabilistic solution techniques.

As in the case of JTLS, JANUS uses the logic of simple models with the inner limitations described above and the best computerization for management and visualization of the data outputs. It has no common data with JTLS. The JANUS model has been in use in the U.S. Army since 1979. Its more updated version is dated September 1987.



GLOBAL SIMULATION MODEL: THE RAND STRATEGY  
ASSESSMENT SYSTEM (RSAS)

The RSAS constitutes an attempt in simulations to concentrate and integrate simulations, to better design a scenario and to evaluate the human component which in the past has been neglected and implied in more easy quantitative data. Doing that, RSAS uses and researches the best technological capabilities for simulation.

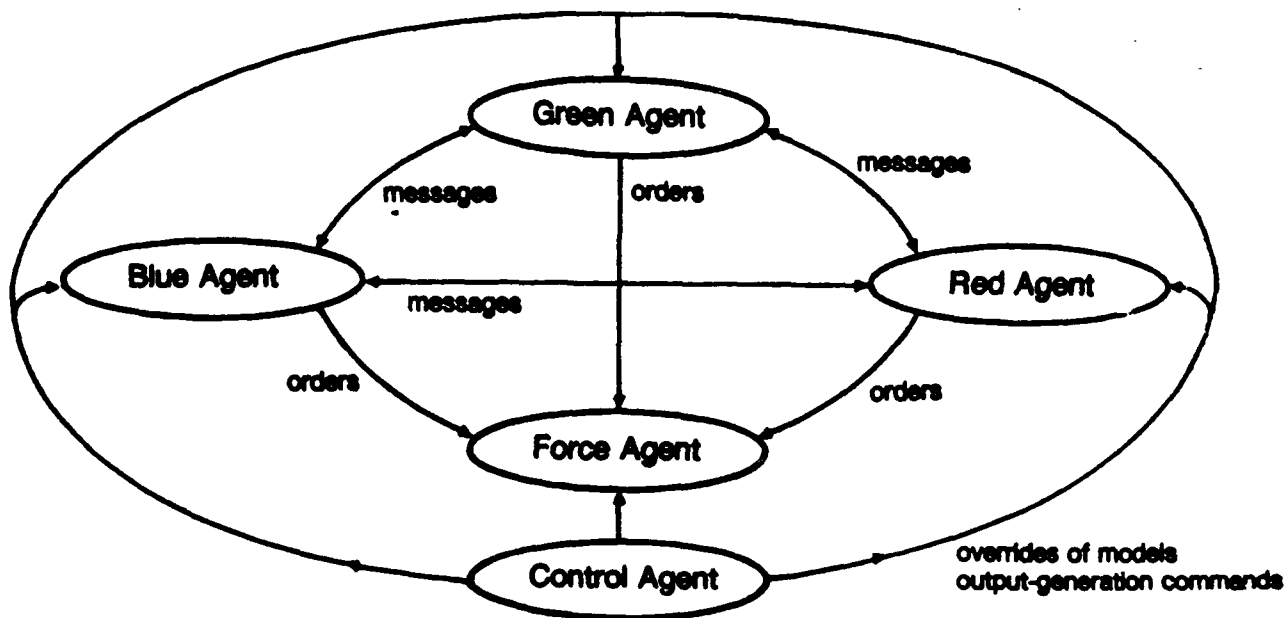
The effort of the RAND Corporation is tailored for the U.S. political-strategic worldwide needs. It focuses on a unique, overall dynamic simulation model which may be defined as the "American solution" in the simulation field and may be compared to the other global solution in the strategic defense field: the SDI.

The RAND Corporation's National Defense Research Institute (NDRI), who manages the RSAS is a federally funded research and development center sponsored by the Office of the Secretary of Defense. The RAND Strategy Assessment Center, a component of NDRI, develops wargaming methodologies and other analytical tools for assessing strategic balance. This research is supported by the Director of Net Assessment (see Table 16).

The RSAS Structure and Characteristics<sup>7</sup>

The set of models that constitute the RSAS structure are depicted in Table 20. As introduced in Chapter I, the fully automated RSAS consists of five "Agents" and of a World Situation

Data Set. The Blue, Red, and Green Agents are decision models that represent the national and military commands of the United States, the Soviet Union, and third countries, respectively. These Agents (or their human substitutes) issue commands to a Force Agent (also called CAMPAIGN), which includes a strategic-nuclear-exchange model, strategic/operational theater simulation models, and a maritime theater model. A Control Agent allows analysts to schedule or arrange adaptive changes in simulation parameters without having to monitor the simulation as it proceeds. The relationships among the Agents are shown in Table 20.



NOTE: Agents obtain information from, and change values in, World Situation Data Set

TABLE 20--THE RSAS STRUCTURE AND CHANNEL OF COMMUNICATIONS

The Blue and Red Agents each consist of a National Command Level (NCL) and subsidiary hierarchical Military Command Levels. The NCL develops objectives and specifies a strategy for execution by the military levels. To do so, it first assesses the world situation. It then establishes guidance for escalation or deescalation and chooses other elements of strategy accordingly. All of these actions are influenced by the NCL's behavior pattern, which can be varied to reflect differences in such matters as attitude, bias, aggressiveness, decision style, and grand strategy. The NCL's automated behavior can be bypassed by the user, who can play the role of either agent interactively or schedule a rigid set of decisions. The Military Command Levels represent major Blue and Red theater commands. For Blue, these are the Joint Chiefs of Staff and the various CINCs--SACEUR, SACLANT, CINCSAC, and so on. For Red, they are the Supreme High Command of Forces and other commands for strategic nuclear forces and for various theaters--Northwestern, Western, Far Eastern, etc. Each Command Level gives orders to the one immediately below it or to the Force Agent and sends information and requests to the level immediately above it. The Military Command Level models have the character of adaptive analytic war plans motivated by prior human games and studies. They contain the large numbers of detailed orders and procedures required for a branched plan characterized by a continual need for force-management decisions, such as the daily apportionment of aircraft across missions.

The Green Agent represents the national political-military decisionmaking of countries other than the United States and the

Soviet Union. For each country, the RSAS user can specify a "temperament" ranging from that for a satellite or a staunch ally to that for a reluctant ally or a neutral country. The user can also assign degrees of assertiveness, opportunism, and staying power.

The Force Agent is a large, sophisticated, and interactive simulation model that tracks military forces worldwide and assesses battle outcomes and the results of other operations. The model can consider air and ground combat in major and secondary theaters, noncombat operations such as mobilization and dispersal, intertheater (strategic) mobility, logistics, strategic nuclear warfare, space-based strategic defense, naval combat, and strategic command and control. The Force Agent keeps the game clock, advancing the simulation by intervals of a few minutes to a day (depending on the character of the conflict). It also notifies players or decision models when specified events occur, giving them opportunity to take action.

The Control Agent aids analysis and gaming. It aids analysis by allowing the user to specify such items as the outline of a game scenario or what displays should be logged. The Agent aids gaming by allowing the user to insert events that the simulation models would not have come up with on their own. Those events can be scheduled to occur at a designated time or on the occurrence of a specified event.

In these agents and their interactions, the RSAS combines traditional simulation, artificial intelligence, and other techniques for man-machine operations.

The conceptual difference of the RSAS with the other described models is the ability of the complex model to:

- Focus on integrative strategy-level considerations (both nuclear and conventional)--adopting the perspective of national authorities and, to some extent, of theater commanders. To achieve this, the RSAS has been designed from the top down so that a user could work with aggregated strategic concepts and variables without being forced to worry about the details of military operations.

- At the same time, provide capability to address operational-level issues solving the major problem in the past to fill the gap between strategic- and operational-level thinking and to use the same data at different levels.

- Face up to the challenge of planning under uncertainty, because it is able to consider changes about political-military context, forces, strategies, command and control, weapon capabilities, and the laws of war.

- Plan for a mix of model-supported human war gaming, interactive simulation, and automated war gaming.

- Emphasize clarity and flexibility of assumptions. The RSAS is very complex, since the likely evolution of plausible crises and conflicts in the real world is sensitive to scores of factors. It is therefore essential that users be able to change the underlying assumptions. Software tools have been provided for that purpose, along with considerable on-line documentation. Most data can be changed interactively during a simulation, without recompiling computer programs.

This is the overall picture of the RSAS effort to date. Focusing on the structure of interest, it is now necessary to analyze at what extent the conceptual requirements shown at the end of Chapter II have been realized, particularly on the fundamental wargame simulation element that remains the human component.

### The Red and Blue Agent Temperament<sup>8</sup>

Under RSAS, for Soviet and American national command level behavior the term used is "Temperament": intended as a plausible characterization of thinking that determines the general direction of escalatory policy and the selection of war plans. There are four themes chosen to express Red and Blue full temperament: strategic orientation, warfighting style, flexibility and perception. Each of them is defined by a certain number of attributes which may have different value and priority rating. The possible interaction of the described four levels of temperament quantification (themes--attributes--values--priority rating) expresses the Red and Blue behavior and possible decisions in crisis and conflict situations and constitutes the starting point of all the simulation process. Follow-on changes in the situation might induce changes in these decisions and consequently a restart of the process like in classic human interaction. This simulation capability is still under research and evaluation and has not been achieved completely at the present moment. The main consideration for the purpose of this study is that the Red and Blue agent temperament has been

simulated in deep detail. This consideration together with the evidence that in the past both the U.S.S.R. and the U.S. behavior have been characterized by large predictability mainly related with the characteristics and behavior of the political leadership of the moment, gives the impression of a sound Red and Blue agents simulation.

### The Green Agent Behavior<sup>9</sup>

This part of the RSAS is the most important to the warfare simulation model object of the research because it includes 34 of the 36 "Mediterranean committed" countries and the ones characterized by their unpredictability.

An actor modeled by Green Agent assesses its situation by examining data available to it from the rest of the RSAS. The decisionmaking logic integrates this diverse information into a world view with three elements as depicted in Table 21:

1. The extent to which the actor perceives itself threatened by its political-military environment.
2. The resources it perceives as available to deal with this danger; that is, how effectively it can cope with the threat.
3. Any superpower requests for the actor's cooperation or involvement.

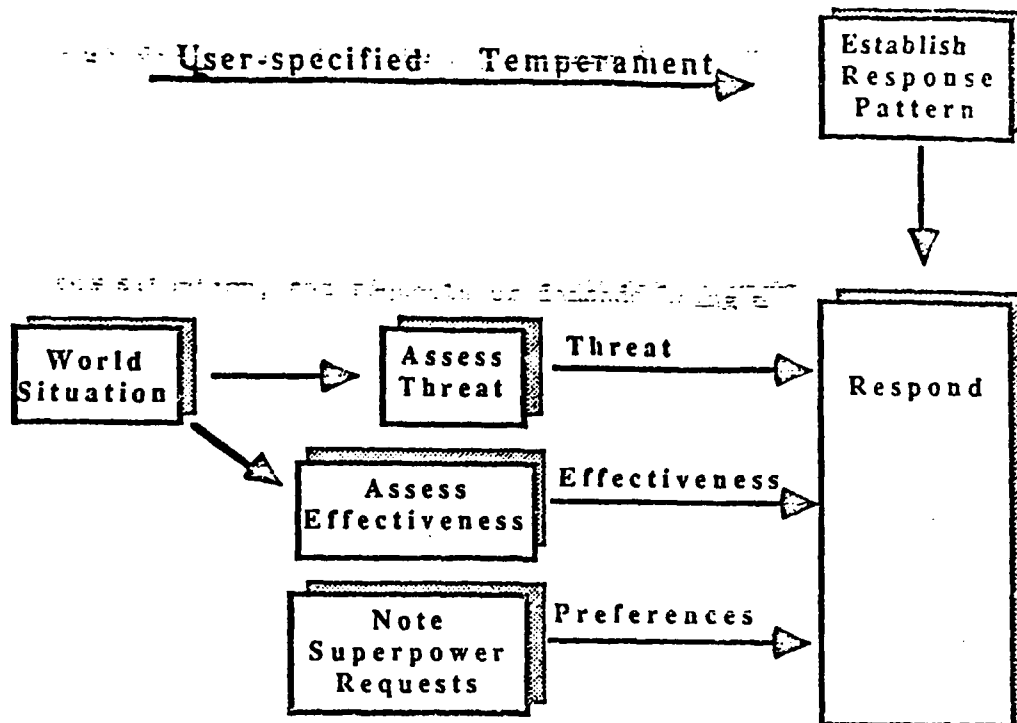


TABLE 21--GREEN AGENT PERCEPTION-RESPONSE STRUCTURE

Each nonsuperpower is modeled parametrically by the Green Agent; factors of interest include generalized measures of sociopolitical orientation, alliance relations, military strength (including nuclear capability), and national decisionmaking character and resolve. These parameters are fully under the control of the RSAS user who can thereby structure the global context of a superpower conflict to reproduce a broad range of third-country behaviors.

The world situation perceived by the actor is processed by decision rules shaped and controlled by these parameters to



produce a set of responses which represent the output of the Green Agent to the RSAS at large. Each actor's behavior is characterized along three dimensions:

1. The extent to which it cooperates with its superpower ally, if any, in granting that ally use of its airspace, territory and facilities,

2. The extent to which the actor involves its own armed forces in an ongoing superpower conflict, and

3. The extent to which the actor independently uses its military assets, specifically any nationally-owned nuclear weapons, in a superpower conflict.

The threat assessment is graduated in seven categories:

1. Mortal
2. Indirectly-Mortal
3. Grave
4. Indirectly-Grave
5. Serious
6. Indirectly-Serious
7. Indeterminate

A country conducts threat assessment using rules which manipulate and interrelate military, geographical, and political information.

The effectiveness assessment of each Green Agent actor is related to its own military strength evaluated on two bases:

--Comparison to the military capabilities of regional neighbors and

--Ability to affect a Red/Blue conflict in the nation's region.

There are three possible results from the effectiveness assessment: high, which indicates that the actor's side would do well if the actor participates; medium, which suggests that the outcome is unclear even with the actor's participation; and low, which signifies that the actor's side will do poorly despite his participation.

The third element, superpowers requests, represents the possible behavior and decision of third countries to join or to support the superpowers action in the theaters. The variables that affect the response of third countries are: side, cooperation, involvement in the specified theater (European, South West and so on), and involvement in the use/support of nuclear weapons. Each of them may receive different values.

The overall result of the threat assessment, effectiveness assessment and response to superpowers requests gives the third country national temperament and its associated responses or decisions that have been categorized in the nine options shown in Table 22.

Category		Temperament
Dependent	----	Captive
	----	Satellite
Reliable	----	Staunch
	----	Reliable
	----	Moderately-reliable
	----	Initially-Reluctant
Reluctant	----	Reluctant
	----	Soft
	----	Neutral

TABLE 22--TEMPERAMENTS

The combination of assigned temperament, threat, and effectiveness assessments gives the response of the green agent different actors, according with the level of cooperation and involvement.

#### Considerations on the RSAS Model

In the context of the Mediterranean theater RSAS presents limitations to satisfying the main requirements. Since the model has been built for U.S. needs and in the superpower perspective, the major number of the area players, the Green Agent actors, are not designed to play an independent role that is able to create situations of crisis and conflict that can force the superpowers to intervene as the theater analysis has shown. Their design as superpower-connected players is too narrow and not adherent to the reality, at least in crisis situations.

Secondly, the choice of attributes and values to figure out the Green Agent actors behavior is mainly influenced by the scenario rather than by the context elements (or the historical inner ties, especially of the southern Mediterranean countries) that lead to the scenario situation. The RSAS attention is more related with the "what" than with the "why" and this, in the area of interest, may make the starting assumption incorrect.

Thirdly, one may perceive a certain lack of adherence with the Mediterranean characteristics and players behavior in some areas:

- While it considers threat perception, it does not consider the different kinds of leadership action and/or reaction. That may lead to intervention despite the threat assessment (psychopathology of leaders; perception and misperception).

- The overall strength of the countries is a military dimension, while the results of Chapter II show the great

importance to be attributed to moral, social, economical, and religious aspects of the countries (see the Israelian wars).

The fourth consideration is related to the effectiveness of the final third countries outcome, that is the response as a result of the temperament:

--It may have a mathematical validity but common sense sees that as simply a further manipulation of the same elements that define the temperament (threat assessment, effectiveness assessment and response to superpowers), so that at first glance the temperament and not the response should be considered the simulation final output,

--It does not take into consideration the component of political opportunism that characterizes the area and that may result in change on short notice in the categories, the variables, and the correspondent values assigned to the actors.

The final consideration concerning RSAS is that it seems too sophisticated for the Mediterranean theater, where "a four-wheel truck may work better than a Rolls Royce."

#### THE ACTUAL AND FUTURE CAPABILITIES

From the needed requirements perspective, the assessed simulation capabilities spectrum presents some limitations:

--the absence of hierarchy, or common data base and integration in the simple models.

--the methods and rules, often extremely subjective, used in selecting and assembling the data in the game models to design the reality.

--the accuracy of data, or the validity of the quantification process.

--the terrain representation limits, especially in a worldwide multiscenario.

--the difficult balance between a workable game simple to understand and a sufficiently detailed one.

--the dynamic of the model to be able to mimic the action-reaction-interaction of the real process of crisis and conflict.

Summarizing, one may consider that in the attempt to surrogate or simulate reality the computerization support is inside certain limits. Beyond these limits the gap grows larger between the simulation and the possible reality.

The validity of the models examined in this chapter is undeniable because they operate at different levels of interest (global, politico-strategic, theater-operational and local-tactical) and because they are among the most current. The frame of possibilities of interest for the present study that they make evident is summarized in Table 23. This table shows the result of the research on the U.S. state of the art.

## PREMISE FOR THE FULL USE OF CAPABILITIES

- Coordination of Research & Development at National/International level.
- Permanent Simulation Organization.
- World Situation Data Set Availability.
- Common Data Availability.
- Users Training
- Players Sound Choice.
- Resources

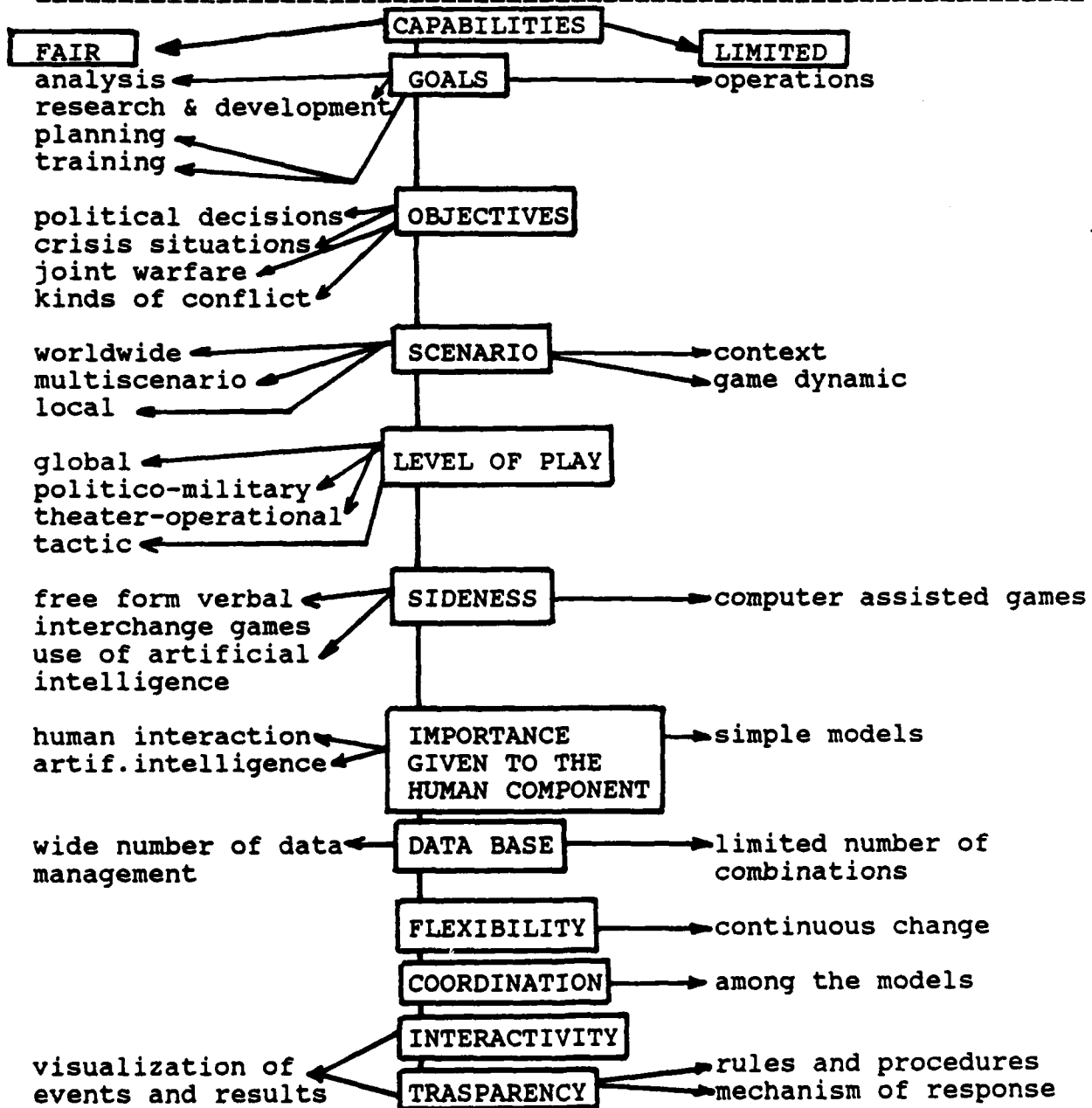


Table 23. Actual Simulation Capabilities

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CHAPTER IV  
REQUIREMENTS VERSUS CAPABILITIES

To sum up the results of the research for the Mediterranean warfare simulation model, let's review Tables 14 and 23 that summarize respectively the requirements and the capabilities identified in the previous chapters of this individual study. Comparing capabilities and requirements, the overall impression is that the first almost satisfy the second, in the repeated perspective that simulation - as a reality abstraction - cannot structurally reproduce and substitute completely real life. The problem starts in a search for sound coordination of the models in a single framework, because the actual capabilities belong some to a model and some to another, while there is not a single model that possesses all of them.

The research of Chapter III gives us the picture of a big effort that is far away from the desired goal. In the U.S., the actual capabilities range from an attempt of a global interactive model where too much importance seems to have been given to the automation support, considered the magic tool to fill the gap

between simulation and reality, to the "classic" two-sided models, large enough to cover the different theater decisionmaking levels (politico-military, operational, tactical) and well supported by computerization.

On the other hand, the only model that is global, hierarchized (or unitarian) and that collects the main number of simple capabilities is the RSAS, that one may consider the synthesis of the simulation trend and consequently "the best product" on the actual market.

Consequently it is possible to depict two possible structures for the Mediterranean warfare simulation model, in the final aim to coordinate simulation in a single framework and to best cover the spectrum of the main requirements:

- a single global model, with an horizontal range of appraisal from the Mediterranean theater to the worldwide issues of interest and a vertical range of action that includes all levels of play; from politics-strategical to local-tactical.

- a family of hierarchized and integrated models, one for each level of play and with the same overall ranges of appraisal and action.

The issue to be solved is to examine which one of the two options is able to provide the major number of capabilities to satisfy the requirements.

The single global model option could theoretically be RSAS, but redesigned for the theater characteristics and for the Italian needs. As mentioned previously, RSAS seems to be too sophisticated and with some basic limitations. In the Italian

perspective, one may ask if a "mega wargame" still under development is not too much, which is extremely expensive (cost has been 30 million dollars for research and development and about 2.5 million dollars per year for system management<sup>1)</sup> and burdensome in terms of system management in a country that is characterized by a low level of natural attraction for the computer culture intended as major player in decisionmaking problems. The actual simulation development in Italy as well as the cost effectiveness comparison discourages from such an initiative and this is supported by two other considerations. The first is that the U.S., the most advanced country in simulation, has not yet reached the expected results in terms of outcomes effectiveness. The second is that the approach to strategic military problems in the U.S. is much more characterized by the scientific than by the creative component, so that the RSAS is not only a tool designed for the American needs but has also been tailored for its strategical and military thinking. This thinking varies widely from the European one and much more from the Mediterranean one. As an example, long term planning is a concept that fits the American dimension and its worldwide commitment, while in the Mediterranean crisis and change reality has almost no meaning or relevance. In addition: RSAS design finds its first validity in the predictability of the U.S. (and at a certain extent the USSR) capability, role, behavior and decisions but not found on the other "Green" countries predictability; and this seems enough to suggest to discard a model like RSAS. The second option may be less outstanding and modern but has at least three positive aspects.

The first is that it fills the actual Italian gap in operational research simulation. The second is that it is more affordable in terms of cost and management. The third is that because it is composed of enough simple separate parts or models, it can be modified and coordinated to better adhere to the Italian needs and to the Italian strategic and military thinking and acting.

In any case, the concrete result of simulation is not just in the model structure but in its premises. The first and structural one is the expansion of research and development at national and international level to make the different models that constitute the global warfare simulation tool hierarchized first and continuously updated, introducing the needed technology to insure adherence with the dynamic requirements at the different levels of play. The second is the concentration of simulation management and control in a permanent military organization (Warfare Simulation Center) able to interface the academic and scientific communities, the strategical national and international institutes, the political establishment (players) and the defense organization for a sound, coordinate use of simulation. The Italian Institute of Strategic Studies (SSI - that works directly for the Defense Chief of Staff) might be the logical solution in accordance with the above requirements.

The Warfare Simulation Center should be part of the SSI, responsible for defense simulation coordination and guidance together with the coordination external at the Defense Department. The overall control of warfare simulation should remain with the military. The reason for such a suggestion

lies on the evidence that the military is interested in simulation because it is related to the possible use of military means. Consequently the military becomes the first user and has the final responsibility of the real use of force in the development of crisis and conflicts situation.

The national role of a Warfare Simulation Center could be mainly related with the following issues:

- to constitute and update a world situation data set of national interest.

- to coordinate the warfare simulation components in a single frame.

- to use simulation for all scenarios related to defense of the national interests as evaluated, collected and selected by the Strategic Studies Institute board.

- to be able to interface with simulations inside the national and the NATO communities.

The potential significance of such capabilities is very wide:

- to constitute a link in strategic principles and realities among succeeding political administrations and military leaders and to provide an efficient and credible mechanisms to test proposed changes in strategy.

- to set a standard for analysis of strategic and defense issues.

- to link in a permanent framework the strategic and military thinking together with the political leadership and the national research and development communities.

- to provide research and data collection on specific national military problems.

- to conduct analysis of selected hypotheses and of experimental results.

- to train leaders and personnel of the military community and of the national decisionmaking level and, consequently, to better tie the military community with the national one in terms of knowledge of problems, sharing of information, requirements, possibilities, policies, and actions.

END NOTES

- <sup>1</sup> Information given during the visit to the Net Assessment Office, OJCS, Pentagon, Washington, D.C., November 1987.

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CHAPTER V  
CONCLUSIONS

Because the aim of this research has been a warfare simulation model for Italy and the terrain of research has been warfare simulation itself, the conclusions are a collection of the main issues which arised on the use of simulation for strategic analysis and operational purposes and on the proposed warfare simulation model.

ON THE USE OF WARFARE SIMULATION

The warfare simulation issues of interest are essentially four. The first is its utility, and is related with the evidence that, at national/politico-strategic level, the decisionmaking process of today is the result of interaction among a continuously larger number of actors and issues: political leadership, economic constraints and requirements, objective capabilities, social influence, media behavior, military strength and so on. In this perspective, at least in a democratic country like Italy, strategy is no more than just a military matter. The



main role of the military leadership shifts to the organizational and execution phase and does not play a fundamental role in the conceptual frame of decisions where the principal actors are the political leadership, the economic influence and capability and the public opinion consensus. All this environment asks for prevision, assessment of capabilities on real time, information, coordination and economy of efforts at national level and among the partners that share the same objectives and the same threat to national interests. For Italy it is the NATO community more than just the military Alliance. In this perspective, there is simply no way to conceive, implement and maintain sound national and NATO strategies without confronting - and explaining to the broader national audience - the complications that warfare simulation illuminates. Warfare simulation, in conditions of uncertainty and in presence of complex problems may assess the great number of possible hypothesis and options of today's reality. As such, warfare simulation adds a new component to the national defense because it increases consciousness of the situation, helps to better understanding of the fundamental relationship among goals, resources and action, and consequently, increases cohesive preparation and capability to defend freedom and development. Inside the military dimension warfare simulation maintains the same characteristics and potential, while satisfying other needs such as playing hypothetical conflict situations that simply cannot be played with real forces or exercises that if played in real life could be extremely expensive. The connection between operational warfare simulation and real training makes the second "mission-related" and

consequently more adherent to the effective needs in terms of skill and readiness of the military units. Simulation, of course, should never totally substitute real training but has high capability to complement it. The main support of simulation should focus on the decisionmaking process and as such demands from actual and future military leaders a broader understanding of the simulation constraints and of the techniques employed by computer programs.

The second issue is about the role of warfare simulation in the strategic thinking and in the operational play. The basic idea is that it should remain one tool of the strategist and military leaders and - as an abstraction of the reality - should never totally substitute the other classic approaches, methods, and appraisals.

To be a reliable instrument it should remain credible and in this concept arises the third issue that examines the role of the human component and of the technology inside warfare simulation. The main aim of simulation remains the one to train leaders (that is, the human component), taking advantage of all the possible support offered by the technology. The logical ranking of the three considered elements should be human component first, warfare simulation the second, and technology the third. But warfare simulation influences the leaders and one has seen the attempt to surrogate human decisions with the technological tool. The problem "man and machine" or "just machine" should not exist, while it is the trend possible reality. The main problem is if this decision is still to be made or if the "point of no return" has just been bypassed. This is the main threat to the

credibility of the simulation process today and in the future. If one considers that in September 1941 Admiral Isoroku Jamamoto played, in advance, in the Japanese Naval War College the Pearl Harbor battle with identical results as the actual attack and without computer-assistance, it is hard to believe that it is necessary to reduce the human capabilities role for the continuous expansion of sophisticated technology. This concept does not mean to refuse the technological support, rather it means to give attention to the inner balance between art and science. One must also take into account that the technological primary role in warfare simulation is dangerous for the leadership in two ways. First because the human component needs less and less to train and consequently may not be able in conditions of technological blackout to substitute it. Second, as more technology takes place and more becomes sophisticated, this increases its own vulnerability and the probability of a blackout. On the other hand, warfare simulation has not grown at the same speed of the reality. The simulation of ancient times had a good chance to almost predict reality because reality was simple. Today simulation is no more able to fully assess the complex interactive reality and consequently it is no more a decision tool but just a recommendation, one among the others. The potential of simulation is such that it might regain its ancient role and many consider that technology is the key element for such a qualitative result. The proposed opinion is that technology can help but that the growth of the simulation effort remains in the human capability to use it at best. And this

call for the fourth issue, the adherence of the use of warfare simulation to the theater and to the users. Warfare simulation cannot simply be applied in the same way to different situations, and the scenario construction is not the only element to make the simulation appropriate to the local reality. All the warfare simulation structure and design should be adherent to both the theater and to the users, to their strategic thinking, capabilities, and behavior and should not be - as seems to be sometimes now - the aseptic kingdom of the analysts and of the research communities.

The above issues influence, of course, the recommendations on the possible warfare simulation model for Italy.

#### WARFARE SIMULATION MODEL KEY ELEMENTS

Simulation also obeys the fundamental organizational rule that make the best use of resources (human capability, technology at disposal and available funds) as a goal. With this in mind, the key elements of the recommended model are:

1. Constitution of a Warfare Simulation Center, to be part of the National Strategic Studies Institute and consequently to belong to the Defense Department sphere of responsibility and control. Roles and activities of the SSI and of the WSC have been described in the preceding Chapter IV.

2. Constitution "ad hoc" and continuous update of a World Situation Data Set including quantitative and qualitative information of all the potential players in the international environment (countries, groups of power, every kind of alliance

and aggregation and so on), using every source inside and outside the Department of Defense (other Departments, academic communities and strategic institutes).

3. Use in a global frame of a family of hierarchized and integrated models for operational research and analysis, planning and training purposes related with the national security objectives and with the five joint forces main missions:

- one model at political-strategical level, designed in multi-sided free form verbal interchange with computer assistance in bookkeeper and data reference role. The main characteristics of the play at this level should be:

- o to play political-strategical decisions in hypothetical crisis and conflict situations in the Mediterranean theater at NATO, national, and theater-operational levels.

- o to make full use of experts in player roles.

- o to use standard rules to explore and assess other countries attitudes, values, possible behavior and decisions.

- o to make use of any useful simulation tool to assess the real situation and to refine outputs (POLICON model and others).

- one model at joint forces theater level (JTLS or similar), computer assisted and with a scenario comprehensive of the "Mediterranean committed" countries. This model should be able to process at the operational level the outcomes of selected political-level play using the same data set for crisis (forces alert, and eventually deployment) and conflict (forces use) situations. Of course the more hardware sets available, the more overall capability to play in the contemporarily different

situations and to shorten the time to arrive at the possible hypothesis and options. The peripheral hardware of the model allows for concrete links inside and outside the Department of Defense. -

- one model like JANUS at tactical-local level (battalion/brigade) for the Army, for detailed analysis and assessment of individual to company sized elements in combat situations. This model should be especially able to process at tactical level the selected outcomes of the joint forces theater level model.

Other theater level and tactical level models could be coordinately used for the other Services specified needs and to refine and to reassess the outcomes of the hierarchized and integrated family of three models as well as for other purposes (training, research and development, etc.).

This basic composition proposed needs amalgamation to reduce the technological limitations examined in Chapter III, to coordinate and integrate the three components models and to make more adherent the overall warfare simulation system to the requirements of the theater and to the users.

The key for amalgamation lies in the conceptual design to coordinate warfare simulation at national/international level and in the concrete results and outputs that will proceed by running the play.

This concept makes it easier to draw the final conclusion: if the "global warfare simulation concept" utility is shared, it is necessary to do it. How to begin to fill the technological gap is important, but how to use and manage it in the continuous

playing process is fundamental. How to make simulation easier and "more real" and how to fully satisfy the theater requirements will be the consequent dynamic challenge for designers and users.

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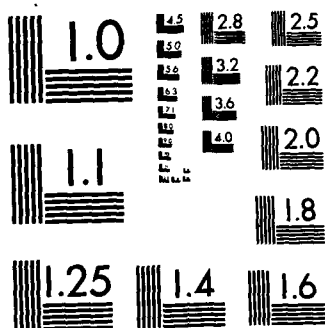
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